MUNICIPAL JOURNAL AND ENGINEER

VOL. XVI NEW YORK, FEBRUARY, 1904 No. 2

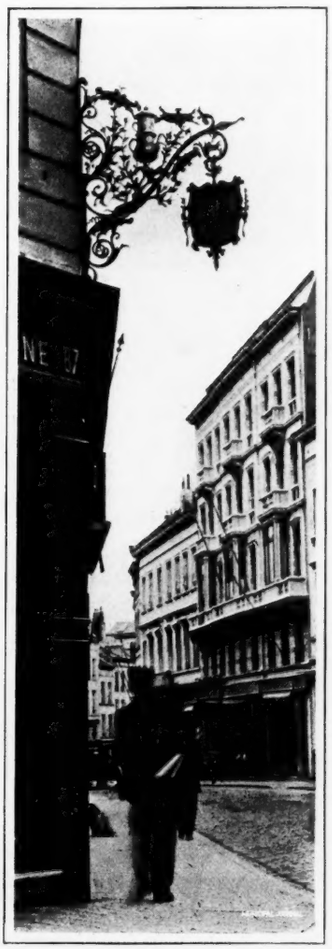
CIVIC ART IN NORTHERN EUROPE*

Street Fixtures—Street Advertising—Height of Buildings Limited—Floral Decoration—Color Schemes in Russian Cities

By Milo Roy Maltbie

STREET FIXTURES

THE beauty of city streets depends not alone upon their direction, their width, their arrangement or even upon the trees, monuments and structures that border them, but also upon the character of the street fixtures which must be placed at frequent intervals, such as lamp-posts (gas and electric), street name signs, house numbers, tramway stations, public comforts, letter boxes, fire alarms, trolley poles, etc. These appear before the eye so constantly that they determine very largely the character of a street, and an otherwise attractive thoroughfare may be marred greatly by ugly fixtures. Because of their seeming unimportance, they have been the last to receive attention in the municipal art movement not only in the United States but in Europe. It was only recently that the Belgian National Society for the introduction of art in the streets—the first of its kind—was inaugurated, and instances of ugly street fixtures may still be drawn from almost every city, while it is more difficult to cite artistic examples in this direction than in almost any other.



ADVERTISING SIGN, BRUSSELS

However, where there is art feeling or a widespread appreciation of the beautiful, there art finds expression consciously or unconsciously. As one would expect, the most artistic street fixtures are generally found in France and Belgium, and the least artistic in Russia. Paris, Brussels and Copenhagen have the finest street lamps. In the last mentioned city, openwork steel construction has been utilized for electric lamp and trolley poles more effectively than elsewhere. Budapest has a few posts where flowers and foliage plants have been used to advantage. The street name signs of Paris, consisting of a blue enameled plate set at an angle with the post so as to reflect the light of the lamp and thus be legible day or night, are both artistic and useful, and the same scheme has been adopted for indicating house numbers. The tramway stations of Brussels are improving year by year, and are vastly superior to those of Paris. Vienna and Budapest have the most tasteful comfort stations.

ADVERTISING KIOSK, STOCKHOLM†

The Paris isles of safety are both useful and ornamental,

* This is the second of a series of four articles, comprising the special report to the Municipal Art Commission of New York City by the assistant secretary, Dr. Milo Roy Maltbie, as the result of studies and observations made in the summer of 1903. It cannot fail to have an intrinsic value to all American cities.—[EDITOR.

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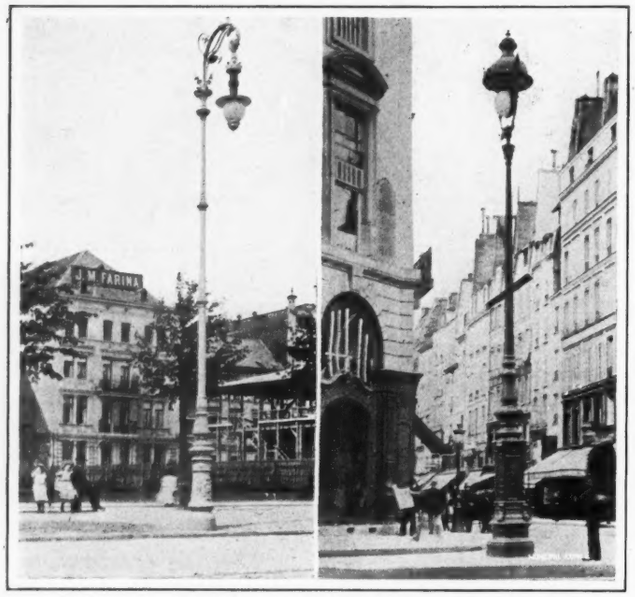
for an artistic lamp-post is usually placed in the centre and sometimes it contains a clock as well. (The utilitarian side of this combination is worthy of mention here, for by placing the electric light in the middle of the street it lights both



ELECTRIC LIGHT, COLOGNE

ELECTROLIER AND ISLE OF SAFETY, PARIS

sides and reduces the number of street lamps to two-thirds or one-half the number necessary where the posts are placed on the walks.) Many other European cities have followed the same plan. Ornamental clocks, such as on the Jungfernsteig, Hamburg, are found in some cities, but their number is not large.

Street Advertising

But why even those cities that have progressed farthest in civic art should tolerate the advertising kiosks, often ugly in themselves, and made still more ugly with their gaudy placards, even upon the most attractive boulevards and sometimes in the parks, is difficult to comprehend. Having spent large sums to make the boulevards and parks attractive, it seems strange that for the small return from advertising privileges the city authorities should be willing to nullify in part their own efforts to create beauty. Often the cities that have done the most to restrict private advertising signs and to eliminate "sandwich men," "banner men" and wagon bill-boards are the very ones which err most egregiously as to kiosks. Nothing can account for this except reluctance to relinquish any source of public revenue, however small.

Some cities have attempted to lessen the bad effect and indirectly to improve the character of the advertisements by making the structures themselves artistic, and some improvement is manifest in this direction. The number of kiosks could also be reduced upon the business streets even where they serve the useful purpose of news-stands and sub-postal stations. The same may be said of many of the public comfort stations in Paris, which are used as advertising boards. There is room for great improvement, and their objectionable features are very repulsive to those whose senses have not been deadened by constant familiarity.

Height of Buildings Limited

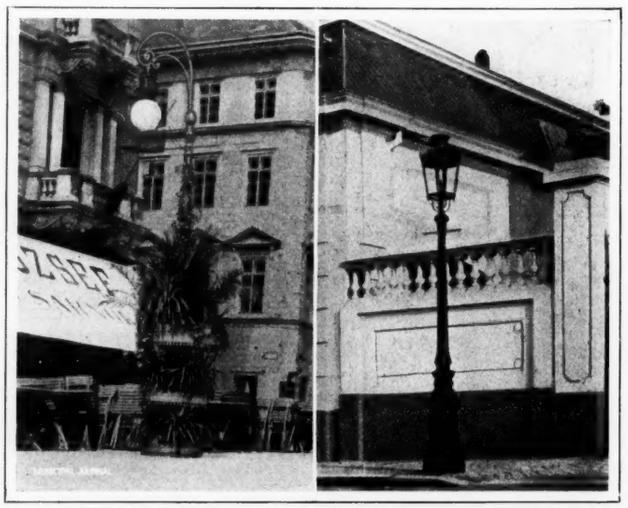
The beauty of city streets is also greatly affected by the character of the buildings which line them. Public buildings are, of course, very few comparatively, and if private initiative is to be restrained and directed into proper channels it must be done largely through statutes and city ordinances. Probably the most common restriction, for it is practically universal, is that limiting the heights of buildings. Generally it varies with the width of the street; the greater width, the greater height permitted up to a certain maximum which may not be exceeded by anyone. The following extract from the Paris regulations, as amended last year, is representative, for while the precise ratio of street width to building height is not the same in all cities, the ratio in Paris is fairly representative.

If the road is less than 12 metres (39 feet) wide, the height of the building must not exceed the width of the street by more than 6 metres (19½ feet). On a roadway 12 metres wide, the house may therefore be 18 metres (59 feet) high, and for every additional metre in the breadth of the road a quarter of a metre (about 10 inches) may be added to the height of the house until the limit of 20 metres (nearly 66 feet) to the eaves is reached, but no building may exceed that.

These restrictions have had far reaching effect. Not only are the streets and lower stores of the buildings given abundant sunlight and air, but the skyline is made uniform. The maximum height is so low that no landlord now desires to erect a building with less height; the land is too valuable. But he cannot go beyond the limit, and consequently structures are neither squat nor towering. Aside from the slight variations due to the different styles of architecture, variations that are interesting rather than objectionable, the skyline is frequently uniform and pleasing.

Building Regulations

Besides the restriction of building heights, there are numerous provisions in the code of every European city regulating, for instance, the width of balconies, the projection of



ELECTROLIER WITH FLORAL DECORATIONS, BUDAPEST

GAS LAMP USED IN PARIS AND BRUSSELS

cornices, the size of windows and the character of lamps, signs, awnings, fences, doorways, building materials, etc. Sometimes these regulations are not the same for the entire city, but vary from locality to locality. In a residential quarter, for example, the proportion of the lot which may be built

upon is much smaller than in the business district. In Dresden it has gone so far that a certain kind of iron fence, so many feet high, no more, no less, must be used in certain residential quarters.

The aim of these provisions, in part, is to prevent the erection of ugly buildings and of buildings so dissimilarly located and so different in style and architecture as to mar the attractiveness of the street. Uusually they are quite effective, but they do tend, if carried too far, to produce monotony rather than harmony. The striking similarity of the houses upon many of the streets of Paris is sometimes attributed to an excess of governmental restriction, but that it is not the inevitable result is proved by the beauty and lack of monotony on other streets where the same regulations are in force. Indeed, there is little in Paris which is more monotonous than the lines of brown stone houses in New York City, and certainly these were not the result of excessive municipal restriction. However, many architectural features that exist in European cities are due to legal restrictions, and not infrequently the results are beneficial rather than objectionable.

Nevertheless, there are not lacking many instances of inartistic streets. Unter den Linden suffers from the lack of harmony in architecture and skyline. An old building of two or three stories frequently stands next to one of six or seven. Blank walls, sometimes with obtrusive advertisements, appear at frequent intervals. Characterless façades elbow those most pleasing. Yet this street is the centre of Berlin, and held by the Germans in almost sacred reverence. To remedy these defects, there is now a law which requires that every structure built upon Unter den Linden shall previously be approved by the Kaiser, this provision being supplementary to the multitudinous restrictions of the building code. As yet the Kaiser's veto has not improved the street, for the old buildings are being replaced only very slowly.

Indirect Methods

The tardy reconstruction of city property everywhere

PUBLIC COMFORT STATION IN PARK, BUDAPEST

hinders artistic achievement. Old buildings will be maintained by unprogressive landlords, even long after it would pay to tear them down and build anew. The injurious effect of these dilapidated or inartistic structures is very much greater than their relative size. Some European cities have tried to encourage early rebuilding by exempting all new buildings from certain taxes for a specified period—e. g., five years. The saving thus made is often sufficient to induce the landlord to rebuild a number of years before he otherwise would.

Among the many ways of indirectly improving the beauty

TRAMWAY STATION, VIENNA

of the streets, there is one more which deserves more than mere mention, viz., the award of prizes to the owners of the more artistic façades upon new streets. More has been done in Brussels and Paris in this direction, I believe, than elsewhere. When a new street is opened, the city authorities announce prizes for the most artistic façades, the competition not to be completed until the whole street has been lined with buildings. The prizes are usually so considerable (often $4,000, $2,500 and $1,500 in Brussels, and one-half of the street tax and medals in Paris) that they arouse a lively competition among house-owners and architects. The general opinion is that the expenditure is fully warranted by the results obtained.

Similar competitions have been held for artistic advertising signs. The immediate results of this experiment have not been so encouraging, but attention has been called to the value and importance of beautiful store signs, and in Brussels particularly, on Rue de la Madeleine, a number of artistic signs may be seen.

Floral Decoration

Municipal effort towards street adornment is occasionally supplemented by organized individual action, although as a rule the number of private societies in Europe that are laboring for city improvement is much less than in the United States. One of the most interesting schemes is that of floral decoration, which has been carried further in Dresden than in any other city visited. It was started by an organization of private individuals, who not only bewailed the unattractiveness of the city streets, but who were determined to do something. After much labor incident to experimenting with all sorts of flowers, plants, vines, small shrubs, window boxes, etc., the society made recommendations, agitated for the adoption of its plan and started to put it into operation. The plan was to induce every holder and tenant in the city to decorate his yards, buildings and window ledges with plants, vines or shrubs. City officials were besieged to set the example, and they decorated most of the city buildings. The newspapers were enlisted. Many sections of the city were personally canvassed. Prizes were awarded for the most artistic results. The movement has become so popular that

even in the poorer quarters of the city, where the cost of keeping up the window boxes means something of a sacrifice, one may find whole blocks where there is hardly a window that does not have its flowers. In the well-to-do quarters the displays are often most elaborate.

AVENUE DE L'OPÉRA, PARIS

Showing Effect of Building Regulations

The transformation of the city has been marked. Nothing so impresses one, when for the first time he steps out of the depot, and sees window after window with its bunch of geraniums, nasturtiums, begonias, vines or foliage plants. These splashes of color give a tone to a building and street that is refreshing beyond description. We are so accustomed to a total lack of color, or, more correctly, to the dull impressionless effect of city streets, that even a small bunch of green, yellow, purple or red catches our eye at once and pleases us out of all proportion to its size. What must be the effect upon those who have few opportunities to see the flowers, grass and trees of the parks, and must content themselves with the window boxes?

Color Schemes in Russian Cities

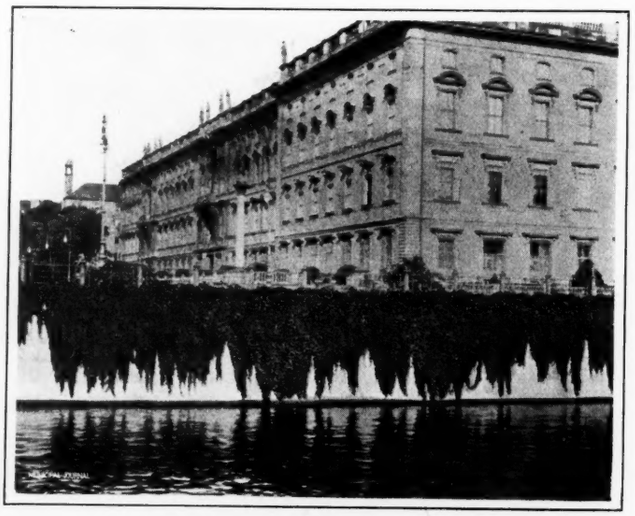
Although Dresden far excels all other cities in this direction, many of them, especially in Germany and Austria, can boast of results well worthy of imitation. It remains for Russian cities, however, to show what may be done with color upon a large scale. There, the exteriors of the buildings, almost without exception, are covered with plaster. The walls are of brick—the ordinary cheap, not pressed brick—and so easily affected by the weather as to make necessary a coat of plaster to protect them. This plaster cannot withstand the weather, and every year it must be repaired and repainted. It is this annual coat of paint, applied in the summer, which offers the opportunity for the introduction of color. Ordinary whitewash is too prosaic for most Russians. Their buildings must be garbed in brighter colors.

The opportunity afforded for the production of artistic results is evident. The city might be made a Pan-American Exhibition upon an enormous scale, and instead of one color scheme, there might be an endless variety, which under proper management might rival the heavenly city of Revelations. But where there is possibility of great achievement, there is also possibility of great failure, and one can easily imagine what lurid results might be produced if bad taste and extreme individualism went hand in hand.

The actual results are varied. There are instances where either by chance, by co-operation or by governmental supervision, there is a blending of colors, a harmony of decoration, a unity of treatment that calls forth great admiration. I am inclined to the opinion that these artistic results are more often due to chance than to plan, for where opportunity is greatest, good results are apt to be lacking. For instance, the Place Dvortsovy is bordered by the Royal Winter Palace, the Ermitage, the Imperial Archives, the Ministries of Foreign Affairs and Finance, the Administration Building, the Summer Garden, the Admiralty Building and Alexander Park, which leads to another group of governmental buildings to the west. What artist with a sense of color would not jump at the opportunity of planning a scheme of decoration for these buildings! What wonderful results could be obtained! Yet last summer each building was being repainted without any apparent reference to the colors of those next to it. The Winter Palace was receiving a light chocolate coat, uniformly applied to columns, walls, cornices and statuary—the usual way. The Ermitage—the art museum—had been dressed in light buff; the Imperial Archives in white; the Ministries in dark brown; the Admiralty in light yellow, and still another building in black.

Even the Kremlin in Moscow—"the sacred city of the Czars"—showed great lack of harmony in spots. The Church of St. Alexis, with its red walls, white trimmings and green roof, was quite attractive; and the Church of Ste. Catherine in blue and gilt was equally satisfactory. The Petit Palais in yellow and white was not so distasteful when considered alone, or even in conjunction with the Church of St. Alexis, which it elbowed on the left, but when viewed with the Church of Ste. Catherine on the right, the effect was inartistic.

Other instances might be cited not only of inartistic methods of decorating public buildings, but of bad results arising from the juxtaposition of buildings, pleasing in themselves but out of harmony with each other. Indeed, this is the direction in which there is most to criticise. There is little cooperation between private individuals or different departments of the government.



CANAL BANK COVERED WITH IVY, BERLIN

In Moscow, much more than in St. Petersburg, there seems to be a color sense, and not infrequently one finds a group of houses that harmonize; and where there is good taste the beauty of the street, perhaps already lined with

trees, rivets one to the spot and calls forth words of warm admiration. I remember well one group on Nikolskaïa, in a business centre of Moscow, which was charming, and another on Krivokolienni Péréoulok. The number of pleasing buildings, when considered without reference to those adjoining, was endless, especially in the suburban districts. The view from the top of Ivan Véliky, on the summit of the Kremlin, is beautiful and impressive. The bright colors of the buildings are toned down by distance; the trees afford ample green for the setting of the picture; the dull red tiles of the roofs add another color to the background, and the brilliant colors of the church spires and turrets give just enough life and variety to the scene.

The attempt to introduce color has not been confined to paint or whitewash. Mosaics on façades are quite common in Russian cities, and occasionally are to be found elsewhere. The subjects and artistic merit vary greatly. Sometimes they are simply decorative effects; sometimes of a semi-advertising character and sometimes representations of important events. The walls of church edifices frequently contain mosaics representing Bible scenes. In Budapest a few of the new public buildings are covered with colored glazed bricks. The new Postal Savings Bank, for example, is in light blue with gilded trimmings. The structures which cover the entrances and exits to the subway stations are built of many colored tiles.

(To be Continued.)

AN ADMIRABLE SYSTEM FOR MUNICIPAL ACCOUNTING

For a long time municipal associations as well as individual officials have been striving to evolve a plan for municipal accounting which will show to the layman and expert as well the expenses and revenues of city government. Little advance was made until the National Municipal League presented a plan on which Comptroller Smith, of Baltimore, modeled his last report. But a still better system has been worked out for stating the annual report of the Comptroller of New York City, by Mr. John R. Sparrow, C. P. A., Supervising Accountant and Chief of the Bureau of Municipal Accounts and Statistics, of the Department of Finance.

The plan comprises six tables and fourteen statements which are derived from the tables and are used to amplify the general items appearing in them. Reference numbers in the tables direct the reader to the proper statements where will be found the details. In Table I are stated the cash balances of the period and the receipts and disbursements therein, unassociated with confusing qualifications. Table II states the main funds into which the elements of Table I are primarily divided; viz., Sinking Fund and City Treasury. In Table III are stated the broad generalities characterizing the Sinking Fund receipts and payments agreeing with the preceding tables. The investments of the Sinking Fund in the stocks and bonds of the city are shown in Table IV. Table V is devoted to the City Treasury, where appear the sources from which the income is derived and where it is expended, only broad generalities being made, the latter statements developing the details.

Preceding the report proper is a net cash summary stating the sum totals of all money to the credit of the City Treasury and Sinking Funds and the total of the actual cash receipts and disbursements after eliminating total of transfers. The following table presents the net cash receipts and disbursements, or the money actually received and paid. Much confusion arises from the failure to distinguish Sinking Fund from the Treasury account in itself. Transfers from one department to another are not cash transactions and have no place in the cash statements of the Treasury, or the statement of the actual cash receipts and expenditures of the city. Over $42,000,000 in transfers might appear to swell the total accounts of New York if the amount were not eliminated by this plan.

After the tables, appear the statements giving in detail the general items in the tables. Thus, Statement 1 shows the depositories in which are placed the Sinking Fund and Treasury moneys and the amounts in each. Statement 2 gives the totals of taxes collected and Statement 3 distributes these totals among the boroughs according as they were collected from real or personal property. Beneath the heading on this, as in the case of the other statements, appears a paragraph showing the law and method pursued in collecting or handling the different accounts, an immense advantage to the citizen in understanding the accounts. In addition to this, another feature of the report consists in placing the totals at the top of the tables as well as at the bottom.

An additional feature of the report appears in Statement P, wherein is given the real property, public and private, exempt from taxation. Schedule 1 of this Statement expands the total of the first showing the character of this exempt public property. Schedule 2 treats exempt private property in a similar way.

The budget of the city makes up Schedule H and shows the net expenses of the city government in its different departments as appear from the warrants paid by the City Treasurer. In this direction the plan is not yet complete. From this general statement of the expenses will be developed every essential detail for which money is expended. The expenses of the city government will be sub-divided as being for General Government, Public Safety, Charities, Corrections, Public Ways, Public Industries, Education, Libraries and Museums, Recreation, Debt, etc., each of these classifications being separately totaled, and the aggregate agreeing with the total expenses as given in Schedule H. Statement 2 will treat separately with each of these grand sub-divisions, dividing each of them again. Thus, General Government will be split up under Executive, Legislative, Law, Finance, etc. Statement 3 will take up each of the divisions of Statement 2 and distribute the total for its divisions under such heads as salaries, rent, lighting, water, etc. This Statement will thus show the amounts paid in the different boroughs for each of these purposes in each department and the totals for the whole city. It can be readily seen what it costs to run any one branch of any department, the totals for each class of item, as well as the totals for all the sub-divisions, corresponding with the total expense given in Schedule H.

NEW YORK'S SNOW PROBLEM

What a Heavy Fall of Snow Means and How It Is Removed—Dr. John McGaw Woodbury Beats All Records

By Arthur H. Battey *

When snow falls in earnest in New York City there are a lot of troubles, and those which befall the housekeeper, or the people who want to get down town or up town, in a hurry are not the heaviest. To the Department of Street Cleaning it means activity by day and night, sleepless vigils and constant devising of ways and means for carrying out plans which, although carefully matured and thought out far in advance, are more likely than not to be knocked all awry by circumstances over which that particular department of the city government has no control. People who think that the task of removing eight and a half inches of snow, the official record of the fall which opened the new year, is tackled in a haphazard way would be surprised if they could watch the operations of the "Snow Bureau," as that part of the big department is called which takes charge of operations when the streets are full of falling flakes and the big snow plows of the railroad companies are clearing the way for the impatient trolley cars.

The Work Carefully Mapped Out

In the first place, every block of the 550 miles of paved streets in the Borough of Manhattan is mapped, and the exact number of square feet of pavement is marked on the map, so that in every district—there are twelve in all in the borough—the amount of snow to be handled is known in cubic feet as soon as the official statement of the United States Weather Bureau is issued announcing the total depth of the fall. On the figures given out by the government officials all the computations are based, and those figures regulate the amount to be paid the contractors for clearing the snow from any given number of blocks, for the Snow Bureau deals entirely with contractors, and works independently, although under the careful supervision of the Commissioner of Street Cleaning, Dr. John McGaw Woodbury.

NEW YORK "WHITE WINGS" CLEANING BROADWAY AFTER THE LAST SNOW STORM

For the storm spoken of a high water mark in area of streets cleaned was reached, the aggregate being 168 miles of highways, of widths varying from thirty to 160 feet, the amount of material carted away amounting to approximately 1,750,000 cubic yards. The Commissioner estimates that the snow carted from New York's highways since January 1 would make a cube 318 feet high, or a lump sixty-six times the size of Madison Square Garden. No computation has been made of its weight, for the reason that the same cart will carry loads only two hours apart, and all through the day no two loads would weigh alike, owing to density, moisture, and other variations. In this work about 10,000 men were employed, and 3,500 teams, outside of the work of the Department's regular employees, and the amount disposed of by the street railroad companies, the latter being no inconsiderable item. Each single cart is scheduled to carry away one and a half cubic yards of snow, whatever its weight, a two-horse outfit disposing of three yards at a trip, receiving a little less than double the pay of a single team. The expense which the Snow Bureau will be called on to meet as a result of the opening snow storm of 1904 will be close to $250,000.

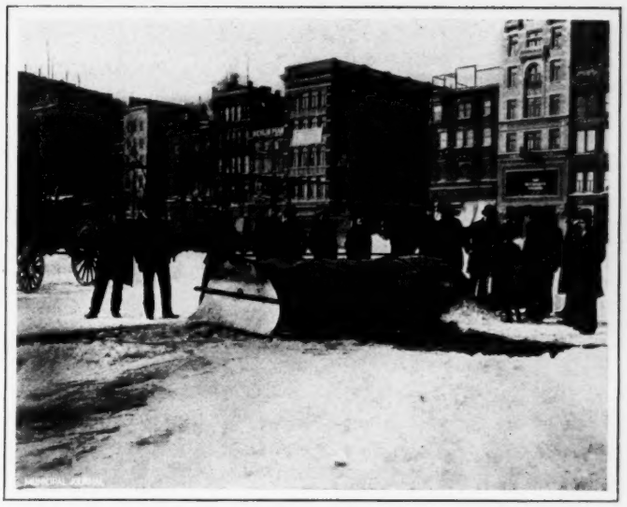
An Increasing Area Cleaned Each Year

A comparison of the Department's maps shows a remarkable advance in the area of streets cleaned since the advent of Colonel George E. Waring into the office of Commissioner. In his first winter, that of 1892-93, he followed in the footsteps of his immediate predecessor, and only twenty-three miles of the city's highways were even supposed to be cleared of snow, the fall amounting to 77.6 inches, and the removal of snow to 86,213 loads of one and a half cubic yards each. In the winter of 1896-97 his record was 702,989 loads removed out of a total fall of only 39.1 inches, and the miles of streets under the care of the bureau had increased to 145. In the winter of 1898-99, 58.3 inches of snow fell, and 1,089,677 loads were removed. Last winter, out of a fall of 27.5 inches 900,842 loads were removed, 543 miles of streets were cleaned, aggregating 24,532,016 square yards of pavement, and 3,729,848 cubic yards of snow. This was done at a cost of $454,423.

That the building of the subway has to some extent de-

* Editor of the *Tri-Weekly Tribune.*

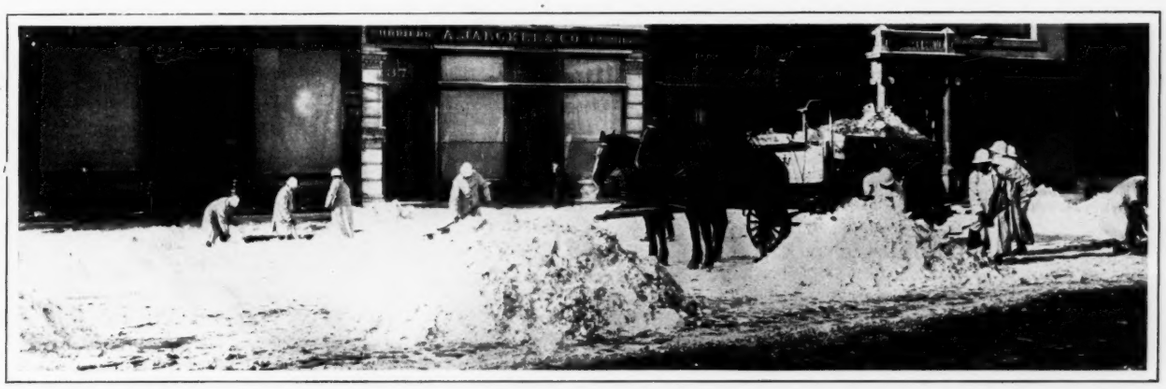
moralized the operations of the Snow Bureau is shown by the fact that the cleaning of Broadway, for the present, stops at Forty-seventh street, in Long Acre square, while Forty-second street received only such attention as could be given to it where excavation work did not interfere. This has been true of many other more on less important streets in the city, and has caused not a little annoyance, and no small measure of blame for the department from those who had not given the circumstances their full share of weight. One of the first streets to be cleaned after a snow fall, and indeed while the snow is still on its downward career, is Broadway. While this work is going on, another gang of men is at work in the streets of the downtown business districts, a third begins operations on crosstown streets of prime importance, from river to river being cleaned, at intervals of about half a mile, Fourteenth, Twenty-third, Thirty-fourth, and Forty-second being in process of cleansing all at once.



EXPERIMENT WITH A SNOW-MELTING MACHINE

The Main Thoroughfares Cleaned First

Another gang struggles with the narrow, congested streets lying east of the Bowery, of which Grand street is the main crosstown artery, and from Canal to Catharine street, from the Bowery to the East River, is the most difficult and dangerous section of the city. Difficult on account of the narrowness of the streets and the conditions under which the work is performed, and dangerous because of the filthy condition of the snow and ice to be removed. All this material has to be taken away in scows, as the rules of the Department of Docks and Ferries, which controls all the piers from which snow is dumped into the river, specify that clean ice and snow may be dumped, while the Health Department insists that it shall be got rid of somehow. From Fifty-ninth street north, and from the western edge of Central Park, to the Hudson, no attempt is made to clean the streets of snow except by the railroad company, while the lower East Side receives an effectual clearing up. In explanation of this seeming inequality, Mr. A. P. Thorley, First Assistant Inspector of the Snow Bureau, says: "There is a very good reason for this apparent slighting of the West Side taxpayer for the apparent benefit of the dweller of the lower East Side. The West Side is populated by a class of people who live in good houses, are as a rule fairly well-to-do, and above all, have an idea of what civic cleanliness means to themselves and to their neighbors. This means that the snow in those streets is comparatively clean and even when left to melt, leaves behind it nothing which disfigures the streets or is a menace to the people living on them. On the lower East Side, especially in the district spoken of, the population consists of people who use the streets for a dumping ground for everything of which they may desire to be rid, and, as a matter of fact, leaving the snow to melt there would mean an outbreak of disease which would be a source of danger to the whole population of the city. You would be surprised to see what our carts are expected to carry away after a snowfall on the East Side, and the best comment on its condition is the fact that we have to scow it away, as it is too filthy to be dumped from the pierheads.



CARTING SNOW FROM BROADWAY, NEW YORK

"So, you see, that it is a matter of sanitary expediency and for the general good of the city that the most dangerous spot from a medical point of view, should receive early attention, even if some of the better parts of the city are neglected.

"It would be a physical impossibility to clean the West Side streets spoken of, anyway, under existing conditions, as while we might be able to get plenty of men, there are not enough available trucks in the city to handle the immense amount of snow which would have to be carted away. It must be remembered that there is no place on the banks of the Hudson between Forty-seventh street and One Hundred and Thirty-fourth street, where we have authority to dump snow into the river, or a pier from which to dump it. This

means that from Sixtieth street, north, the snow would have to be carted either through or around Central Park and clear across the city to the East River. This would take more carts than we could hire, and more than we could pay for, with the present appropriation for snow removal, even if we could get them.

"We have cleaned more streets this time than have ever been cleaned before, and believe there is some credit due the Bureau for its record. A great deal of our work is done where those most prone to kick never see it, but we feel that with a proper understanding of the task before us, people will be more ready to exercise a little patience, and realize that the Bureau and the Department are straining every nerve to accomplish results which will be of the greatest benefit to the whole city."

Like many other city departments, the street cleaning forces are divided, the Snow Bureau having offices in the Bristol Building, at Forty-second street and Fifth avenue. It is under the immediate direction of Mr. M. D. Bouton, chief inspector.

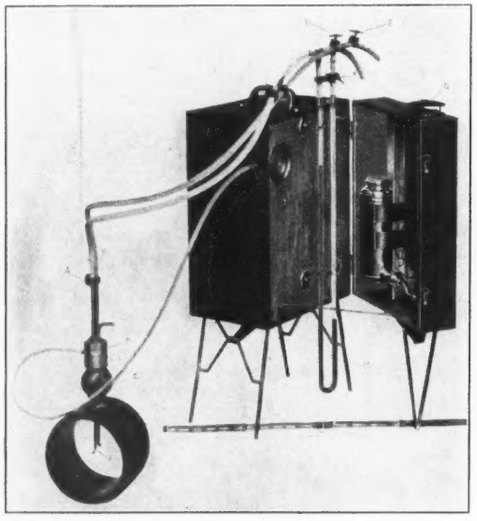
THE WATER WASTE PROBLEM

Where Water Is Wasted—The Value of Water Meters as Preventives—The Pitometer Necessary in Detecting Avenues of Waste

By Edward S. Cole, C. E.

The need of water waste prevention in American cities is to-day demanding more attention than ever before. Several municipalities have been forced to check the waste of water in order to conserve their supplies, and, incidentally, to avoid laying out vast sums for additional reservoirs, mains, and pumping machinery which continued waste would soon require.

The importance of waste restriction may be shown in the case of Chicago, where the present rate of increase in per capita consumption will probably, within fifteen years, call for a water works system of double the present capacity. On the other hand, if waste is restricted and daily consumption reduced to the reasonable figure of one hundred gallons



THE PITOMETER

per capita, the present system would probably be adequate for fifteen years to come. This estimate is based upon the reported increase in per capita consumption, and population in Chicago during the past ten years.

Where the Water Is Wasted

The chief sources of water waste in cities may be roughly given as follows:

1. Defective plumbing in houses.
2. Wilful waste, such as allowing water to run to prevent freezing; extravagant use of hose for lawn sprinkling, etc.
3. Leaks beyond the consumer's premises in mains and services.
4. Loss of action in pumping engines, known as "slip."

The first two causes may be controlled by the ordinary house meter, but it is doubtful whether they account for as much waste as some have supposed. According to Dexter Brackett, C. E., the waste to prevent freezing in Boston was found equivalent to about six gallons per capita daily throughout the year, while our recent house to house measurements in large districts of New York City indicate an ordinary fixture leakage of about 10 per cent. of a total consumption of 50,000,000 gallons daily, as measured by pitometers. These districts represent all classes of residences and tenements in various parts of New York.

Leaks Beyond the House Meter

are larger than is commonly supposed. We know that in a large number of cities, having practically every tap metered, there is a discrepancy of from 30 per cent. to 50 per cent. between the total pumpage or supply and the total meter registration. This great loss, in some instances, seems to remain after allowing for all unmetered public uses, fires, and even for slip of pumps. The conclusion is that water is either leakage from the mains and services, or is illegally drawn through unmetered connections, or both. The city of Yonkers, New York, is a good example where the discrepancy was reported to be 38 per cent. of the pumpage, and it was suggested that single stream of about 1-32 inch diameter from each of the 3,500 taps would discharge the whole amount lost, or 1,000,000 gallons daily. The aggregate of these small streams is enormous, but the underground leaks are not always small. There are many instances on record of broken mains discharging hundreds of thousands of gallons daily into a convenient sewer, some times for years, before discovery. On the other hand, I believe more attention should be given to the loss of water and revenue through the use of unmetered fire connections, etc. I have recently found that 14 per cent. of a reported loss of 50 per cent. in the supply of a metered Eastern city is due to the use of such connections by one or two concerns. May not much of this discrepancy in metered cities be due to this cause?

Slip of Pumps, and Station Use

All of the reported pumpage does not reach the consumers' meters because of what is known as "slip" and "station use" at the pumps.

I have found a discrepancy of 25 to 40 per cent. and even more in several large pumping engines. It is evident that this loss should always be determined and deducted from the reported supply of a city. "Slip" at the pumps not only obscures the per capita consumption, but requires the same pump capacity, steam and fuel as though the full plunger displacement were discharged into the mains.

In 1902, I found that 33 per cent. of the total pumpage at Columbus, Ohio, was lost through slippage at the pumps, a fact which explains the apparently excessive per capita consumption reported for that city in 1900. (See table of George I. Bailey, C. E.) An excessive use of water at the pumping stations for condensing purposes, etc., has sometimes been found. The greatest care should, therefore, be taken to ascertain by special tests and allow for all water pumped as "slip" or "station use" in reporting the water consumption of a city.

Regarding the universal use of meters, experience clearly shows us that the principal benefits of the "meter system" may be obtained with less than 50 per cent. of the services metered, including the largest users. In view of this well understood principle it follows that water meters should be judiciously located in connection with district tests as described below. Even were the universal system adopted, we might still find our meters accounting for 25 per cent. to 50 per cent. less than the total pumpage or supply. Thus we see the need of intelligent investigations with a district meter, in order to show the distribution of waste among the pumping engines, mains, services and plumbing.

The First Step Is to Locate the Waste

The first step in water waste prevention is to locate the waste, and fortunately this detection of waste is now a rational and inexpensive undertaking.

In conducting such investigations in New York City and elsewhere, the waste meter used is known as the pitometer. This instrument is portable, and may be readily attached to any main by means of a one-inch corporation cock, as shown in the accompanying cut. The pitometer gives a continuous photo-record of the flow in the main which is the basis of all district studies.

It is first advisable to put meters on all business houses and large users so far as possible. Next, the city is divided into districts about half a mile square by closing all the main gates but a few, placing pitometer on the inlets and outlets of the district, thus keeping a record of the actual consumption. The total amount used taken in connection with the district population and the water registered by the consumers' meters will give a good idea of the wastefulness of the section taken as a whole, the rate of night use being most significant. In case the whole district shows a reasonable rate of use per capita it may be left as it is, thereby saving the expense and trouble of a house to house inspection, according to the old methods.

Next, Localize the Consumption by Streets

If, on the other hand, an excessive per capita use is indicated, the next step is to localize the consumption by streets, using the pitometer to record the flow as the street valves are closed one after another. In this way the district may be analyzed until the pitometer has indicated the particular subsection which is wasteful. All streets do not use water at the same rate per tap, so that when the waste has been localized within a few streets each smaller but wasteful section is then inclosed by itself and is supplied through its own pitometer. The same analysis by closing street valves is continued until the greatest waste is narrowed within the limits of a block; then, if necessary, the service cocks are closed one after another at night, the pitometer at the same time recording the rate of flow each minute, so that, when a house is reached having leaky fixtures or service pipe, the pitometer will, on closing the curb cock, record its rate of flow. In this way, a record showing the state of every building on the street, as well as of the mains and services, is obtained and waste is localized without making unnecessary and annoying house to house inspections.

This is, briefly the Deacon meter method which has been much used in England. In this country it was used by Dexter Brackett, C. E., in Boston with success, twenty years ago. The pitometer, however, has greatly reduced the cost of such investigations to which it is peculiarly well adapted.

Experience in large cities has shown many instances of large loss of revenue in metered buildings through illegal connections "behind" the meter. In an important office district in New York City, where practically every building is supposed to be metered, the pitometer revealed an unmetered use of about 50 per cent. out of a total supply of nearly 10,000,000 gallons daily. The inference is strongly in favor of illegal conections in that section which is probably typical of many others in our large cities.

The Need of a Bureau of Waste

Every water department should organize a bureau for the systematic detection of waste according to some such plan as has been outlined. The work calls for the intelligent supervision of an engineer, and must be persistently followed up for years, if need be, to secure the final results. The time required to traverse a square mile in this way will depend on the number of waste meters and men employed. Several districts may be inspected by this system at the same time under the direction of a competent head.

A MUNICIPAL THEATRE

The authorities of the City of Mexico have recently adopted a plan intended to secure to the masses the presentation of standard dramas and comedies at popular prices. For this purpose the municipality has leased one of the leading theatres and has advertised for sealed proposals from theatrical managers. The theatre is to be given rent free on condition that a certain number of plays be presented at greatly reduced prices. The government has two objects in view—first to diminish the attraction of the rum shops, and, secondly, to counteract the influence of the lower class of variety theatres. If the experiment proves successful, it is likely to result in a further extension of the plan so as to include a municipal theatre, which shall have as its main purpose the furnishing of elevating amusements.

STREET PAVEMENTS IN KANSAS CITIES

Brick the Favorite Pavement with Most Cities—What City Engineer McCabe Thinks of Brick—Little Repairs Needed Even After Ten Years' Use

*By James F. McCabe**

In responding to the request of our secretary that I should prepare a paper upon "Kansas Pavements and Paving Materials," to be read at this meeting of the Kansas Municipal League, I have been actuated by a desire. The author has treated this subject from the viewpoint of what might be termed the practical, rather than the theoretical, aspect, giving views which have been derived from the actual construction of pavements, and the studied observation of the relative merits of the different materials; and some statistics, which I promise you shall not be carried to the extent

GRADING FOR SUB-FOUNDATION

of being wearisome, concerning the extent of the paving operations which have been conducted in the various cities of Kansas. Such an article must of necessity possess less which would be of interest to the expert and more that would be of interest to the layman and taxpayer, than an article treating the subject from the technical standpoint. I shall also discuss, briefly, as coming properly within the broad scope of my subject, the most expedient and economical means by which propositions to pave city areas may be set on foot and carried to completion.

Choice of Paving Material First Step

The first problem that confronts the property owner along the route over which the conclusion has been reached that it is necessary, for the best interests of the community, the same be paved, is of what material shall the pavement consist? This question is of the first importance, and too often it is decided by the material men themselves, and contrary to the best interests of the property owners concerned and the citizens generally. In many cases, the material men, their agents and promoters, procure the circulation of petitions designating a certain material to be used. Under our paving law it is necessary for the mayor and council either to let the contract for paving to the lowest responsible bidder on the material specified in the petition, or reject all bids. This law practically takes all voice in the matter of the choice of the material to be used, from the city officials, some of whom, at least, by reason of their experience and observation, are competent authority in the decision of this important question, and leaves the decision to a great extent in the hands of the material men, who, as experience in some cases has shown, are apt to subsidize property owners along the streets to be paved either directly, or indirectly, by agreeing that the pavement of such persons shall cost them nothing. In this way there can be created a sentiment in favor of a certain material which otherwise would be rejected

Buffalo's Method of Letting Paving Contracts

The city of Buffalo, N. Y., has a mode of letting paving contracts which, in my opinion, is a most excellent one. In the first place, the property owners take the initiative by petitioning for the street improvement over the desired route. If, in the opinion of the city authorities, it is deemed advisable that the street be paved, the city engineer is instructed to prepare plans, and submit estimates for the same, designating different kinds of material. The city then advertises for and receives bids for the construction of the work, using the various kinds of paving, curbing, etc., designated in the estimates. After the bids have been opened and tabulated, the property owners have twenty days in which to petition the council as to the material which they prefer. As may readily be seen, such a method has the effect of producing lively competition, with the result that the lowest prices may be had, while on the other hand, if the kind of material should be designated in the estimate, or decided upon by the property owners before the opening of the bids, competition would be stifled and the prices paid would be higher. For

ROLLING SUB-FOUNDATION WITH TWELVE-TON ROLLER

instance, in Topeka, last spring, the people on a certain street petitioned for Lyon County limestone to be used in curbing their street. On another street, competition was open. My

* City Engineer of Topeka, Kan. This is a digest of a paper read by Mr. McCabe before a recent meeting of the Kansas Municipal League.—[Editor.

estimate on Lyon County stone was 50 cents per linear foot. There being no competition, the agent for this stone bid the amount of the estimate, and secured the contract. On the other street, competition was warm, and the contract was finally awarded to Colorado red sandstone at 53 cents. The price theretofore had been 65 cents per linear foot. Now, the people on the first mentioned street would have much preferred the sandstone at 53 cents, to the limestone, as it is a much better stone, but the former price kept them from petitioning for it, and had they specified the Colorado sandstone in their petition, it would have cost them 65 cents instead of 53 cents.

The First Requisite of a Good Pavement

The first requisite of a good pavement of any kind is a proper subgrade. Before the preparation of the subgrade, all underground construction—such as sewers, gas and water mains and services—should be done. Private corporations, or individuals, should not be allowed to excavate or refill trenches in a street under contract to be paved after the subgrade has been rolled. The settlements occurring in our newly paved streets are nearly all over sewers, and gas and water services, where the work was done after the completion of the subgrade, the back filling not having been properly done.

After the street has been reduced to subgrade, the earth should be thoroughly rolled and tamped, until the surface of the roadbed is firm, hard and compact. If any depressions occur under the roller, they should be properly filled in with suitable material and re-rolled.

In deciding the question of material, the following points should be given consideration: The first cost, cost of maintenance, ease of cleaning, favorableness to travel, and sanitary qualities. The conditions of each street should be studied and the kind of pavement selected for that particular street, without reference to those materials selected for other streets, as no paving material will meet all conditions. If the street to be paved has a very steep grade, or if the traffic over the same is quite heavy, stone blocks should be used for the reason that they afford a better foothold to horses, and stand the abrasion of heavy loads better than other materials. If light, or semi-heavy grades, or traffic, are the conditions presented, asphalt, brick, or some kinds of wooden blocks* will answer the purpose.

Roadways Are Often Too Wide

The average town and small city lays out its roadways much too wide, and when they are to be paved the question of cost is a serious one. The narrow roadway for wide residence streets is gaining in favor for the following reasons: (1) All pavements, except brick, require a certain amount of compression to keep them in the best condition; (2) The tendency of traffic to follow the crown of the roadway leaves a large space of wide pavement untouched; (3) Narrow pavement forces some of the travel upon all parts of its surface, benefiting the pavement as a whole; (4) Reduces the width to be paved; (5) Costs less to maintain; (6) Presents less surface for the accumulation of dirt and dust, while the wide lawn without its dust is more healthful, and the pavement is far enough away to prevent the dirt and dust from injuring furniture, carpets, etc. Moreover, the wide lawn affords more soil, air and water, to the roots of the trees, thus increasing their growth and beauty.

Most of the pavement laid in Kansas has been brick. The following is an abridged report from the cities of Kansas, giving the material used, as well as views as to the satisfaction given. This report is not complete, as I failed to receive replies from certain cities.

Kinds of Pavements Used in Kansas Cities

The only two classes of pavement laid in Kansas City, Kansas, during the past few years have been constructed of brick and asphalt. The brick pavements have averaged in cost $1.35 per square yard, but at present will average $1.50 per square yard. Asphalt has cost from $2.00 to $2.10 per square yard, and most of this pavement is in fairly good condition. The repair work is done by the street commissioner, consequently the cost of maintenance cannot be estimated.

PREPARATION OF SAND FOUNDATION

Iola has been paving only about a year, using nothing but brick. The first laid consisted of two courses of brick, the bottom course being building brick laid on a cushion of sand with a foundation of crushed stone. It cost $1.43 a square yard. This summer they have been laying the same with six inches of cinders substituted for the broken stone, at a cost of $1.48 per square yard, and have just let a contract for 50,000 square yards, consisting of one course of brick on six inches of concrete at $1.71 per square yard. As the pavement has been down but a short time, there is no data concerning repairs, etc.

Lawrence has 4,541 square yards of pavement, consisting of two courses of brick on sand, which is in good condition, and which cost from $1.16 to $1.25 per square yard; 78,837 square yards consisting of one course of brick on a concrete foundation, which cost from $1.31 to $1.44 per square yard and is in good condition; 1,930 square yards consisting of one course of brick on three inches of sand, which cost 85 cents per square yard, and is in bad condition. Some of this

* A wood block pavement, constructed with a block that has been properly treated, will withstand the heaviest traffic, as has been shown by the use of the creoresinate wood block pavement laid on Tremont street, Boston, the long bridge connecting Cambridge with Boston, on several streets in Greater New York and elsewhere; also, as shown by the use of the Kreodone wood block in paving streets in Indianapolis, Chicago, Cleveland and elsewhere.—[Editor.

pavement needs repairing, but as yet the city has not expended anything on maintenance.

First Brick Pavement West of Mississippi

Atchison, in the year 1887, laid the first brick pavement west of the Mississippi river. It consisted of two courses of brick on a cushion of sand, and cost $2.00 per square yard. *This pavement is still in good condition.* Since that time they have paved more or less each year, using mostly brick. A great deal of this pavement consists of one course of brick on three inches of sand. While some of it has given satisfaction, a great deal of it has been frequently repaired, and some parts of it have been taken up entirely and two courses of brick substituted. The one course of brick paving costs from 70 cents to 80 cents per square yard.

The pavements of Chanute are entirely of brick. They have been down only about a year, but have the appearance of being a good and durable pavement. The pavement is laid mostly on six inches of crushed stone, with a cushion of one and one-half inches of sand. On this is laid one course of brick flatwise paralled with the curb, then another inch of sand and a course of brick laid on edge at right angles to the curb. Their first contract cost them $1.57 a square yard, a later contract $1.74, and they now have under contract some one-course work at $1.34 per square yard.

Pittsburg has nothing but brick, laid on four inches of cinders, then one layer of brick flat, then one inch of cinders followed by a layer of brick on edge. This pavement cost from $1.25 to $1.29 per square yard. Some of it has been down since 1890, is still in good condition, and has cost nothing to speak of for repairs.

The Wichita pavements consist of brick and asphalt, mostly asphalt. The brick pavements have had no repairs and, while quite rough, will last some years yet. There is considerable complaint of its noisiness. The asphalt pavement, laid about twelve years, without a binder, has cost heavily for repairs. Douglas avenue, which was paved with asphalt about ten years ago, using a binder course, is beginning to need considerable repairing. The cost of maintenance is not obtainable. All pavement put down this year in Wichita is under a ten-year guaranty.

Leavenworth has about six miles of paved streets, mostly brick, with some sheet asphalt and some rock asphalt. They have been laying brick pavement since 1894 and most of it is in good condition, though on some streets the bricks are disintegrating and will have to be removed in the near future. The pavement on Cherokee street was laid in 1896-1897, using an old concrete base, and cost $1.02 per square yard. This pavement is practically worn out. This condition is due to careless inspection, as the brick used was not completely vitrified. The brick pavements in Leavenworth have cost from 92½ cents to $1.52½ per square yard, according to the foundation used. Sheet asphalt was laid in 1900, and is in bad condition, and cost $1.88 to $1.98 per square yard. Two of their streets have been paved during the past season with rock asphalt at a cost of $1.14 and $2.10 per square yard, the difference in cost being due to the difference in foundation.

Topeka Favors Brick Pavement

Topeka has 740,000 square yards, or 35.23 miles, of pavement divided as follows: Natural lake asphaltum, 7.1 miles; brick, 22.58 miles; red cedar block, 1.45 miles; Colorado sandstone blocks, 2.4 miles; native limestone blocks, 1.1 miles; macadam, .6 miles; making a total of 363 blocks. The total cost of this pavement, including grading, curbing, etc., was $1,700,000. The first pavement laid in Topeka was natural lake asphaltum, in 1887, at a cost of $2.80 per square yard, with a guaranty for five years. Since the expiration of the maintenance bond, the city has paid over $54,000 for repairs, or 10 per cent. of the first cost.

Colorado sandstone blocks on sand were laid in 1887-1889, at a cost of $2.23 a square yard, and this pavement has given excellent satisfaction where there is heavy traffic, and has cost practically nothing for repairs. The red cedar block pavement was laid in 1887-1888, and it is in a failing condition and in a short time will have to be replaced. This pavement, cost $2.19 a square yard. Against the advice of the city engineer, the city council in 1890 paved Sixth avenue, east, with native blue limestone blocks on sand. This pavement has almost entirely disintegrated, and will have to be replaced with other material. It cost $1.40 per square yard.

The first brick pavement in Topeka was laid in 1890, at a cost of $1.78 per square yard. This same kind of pavement is now costing the city from $1.12½ to $1.18 a square yard. *This pavement, during thirteen years, has cost absolutely nothing for repairs, and is giving general satisfaction.* The method used is that of laying one course of brick flat on four inches of sand, roll this first course thoroughly, then a cushion of one inch of sand and a layer of brick on edge, roll this with a self-propelling roller weighing from four to six tons, fill all the intersections with clean, dry sand, and then cover the whole surface with one inch of sand and leave the sand on about thirty days, when it is swept off.

Different Ways of Laying Brick Pavement

A great many cities pave with one course of brick on concrete, using a cement or tar-pitch filler. In the sections of the State where sand is plenty and paving brick are manufactured in the vicinity, in my opinion, the two courses of brick on sand is preferable, as the cost is considerably less, as well as the noise occasioned by traffic, and the pavement is easily and cheaply taken up and replaced in case of repairs, or alterations being needed as to water, gas or sewer pipes.

Topeka has experimented with five different kinds of pavement. Brick and sandstone blocks have been a success. Asphalt, while very favorable to travel and easily kept clean, has been very expensive to maintain; and red cedar blocks and native blue limestone blocks have been a failure. Taking everything into consideration, I believe the pavement for Kansas towns, where the traffic is not extremely heavy, is brick. It is cheap, the cost of maintenance is light, it is easily kept clean, consequently its sanitary qualities are excellent, and its ease of traction and favorableness to travel are fair. Aside from the merits of the case on the score of utility, durability, and cost, there are other reasons, financial in their nature, which deserve consideration.

In conclusion, I wish to say that there are few things better calculated to enhance the appearance of a city than well paved streets, which are kept in good repair and well cleaned.

PORTLAND CEMENT*†

Its Uses in Various Engineering Constructions—The History of the Industry and Its Rapid Development

By E. Kuichling, C. E.

Introduction

In the past decade there has been a remarkable increase in the use of Portland cement for all kinds of engineering structures, caused principally by the rapid growth of confidence in cement concrete as a building material, and the extensive adoption of this material for numerous structural purposes for which it was formerly considered unsuitable. Ample evidence of this increase is afforded by the recent erection and operation of many large cement manufactories in the United States and abroad, and also by the publication of a number of new treatises on cement and concrete, as well as the frequent discussions of the subject by scientific associations and in technical journals.

It has, therefore, been thought that a series of short papers on Portland cement and its uses may be of interest to the readers of the Municipal Journal and Engineer. In their preparation the aim will be to bring out a number of details that appear to be important, but have hitherto been passed over more or less superficially, chiefly for want of carefully made observations. It is intended to collect and arrange as many such data as practicable, and to invite a discussion thereof in our columns in the hope that some features which are as yet obscure may receive thorough elucidation from those more deeply interested in the subject.

For this purpose it seems proper to begin the series with a brief outline of the history of Portland cement, especially as this part of the subject appears to have been somewhat neglected in most of the text-books which have been published during the past quarter of a century. The sources from which the following paragraphs relating to the early history of cement were compiled are principally Vicat's *"Recherches Experimentales sur les Chaux de Construction,"* Paris, 1818 and 1828, and Pasley's *"Observations on Limes, Calcareous Cements, Etc.,"* London, 1838, copies of which are rarely found outside of large libraries. Their study is highly interesting, as they contain graphic accounts of the numerous experiments made by early European engineers to obtain a binding material for masonry structures as strong as that which was used by their ancient Roman predecessors.

Historical

The fact that certain kinds of lime mortar would set or harden under water appears to have been known by the engineers of the ancient Roman Empire, inasmuch as they exercised great discrimination in selecting the limestone which they used for making lime for different classes of structures. The absence of certain kinds of limestones in the locality of many of their operations, however, compelled them to seek for another means of securing the hardening of lime mortar under water, and this they found in the admixture of finely pulverized bricks or tiles, and puzzolana.

After the fall of the Roman Empire, no substantial progress in the art of making mortar for building purposes seems to have been made until the middle of the eighteenth century, when the growing demand for various great public works in England, compelled the English engineers of the period to turn their attention to the discovery of a better binding material than was then available. Among these engineers was John Smeaton, to whom was entrusted the execution of several important works involving the use of hydraulic mortar; and while he was engaged in building the famous Eddystone lighthouse in 1756 he tested many varieties of natural limestone.

In the course of these investigations, Smeaton demonstrated conclusively that the acquisition of hardness by a lime mortar under water did not depend upon the hardness and thickness of the stratum of the stone from which the lime was made, thus upsetting a tradition that had prevailed among builders since the time of Vitruvius; but rather, that this valuable property depended on the stone's containing a considerable admixture of clay, since all the natural hydraulic limes that he examined exhibited on chemical analysis a relatively large residue of insoluble clayey and sandy matter. It does not appear that Smeaton attempted to add clay to rich lime artificially for the purpose of making a cement, as he always used the best natural hydraulic limes he could obtain in his works; and unfortunately he did not publish an account of his investigations until 1791.

Some knowledge of Smeaton's experiments, however, must have gained publicity subsequent to 1756, since in 1791 James Parker, of the County of Surrey, England, obtained a patent for interposing layers of peaty or boggy earth between layers of broken limestone or chalk in the kiln, and then calcining the mass in order to produce a hydraulic lime. In 1796 he appears to have obtained a second patent, the process then being described as "reducing to powder certain stones or argillaceous productions, called nodules of clay, and using that powder with water to form a mortar or cement stronger and harder than any mortar or cement now prepared by artificial means. * * * * These nodules or concretions of clay contain veins and crystals of calcareous matter, * * * * and on being burnt with a heat stronger than that used for burning lime * * * * and being reduced to powder after burning, and mixed with water just sufficient to make a paste, become indurated in water in the space of an hour or thereabouts. * * * *

* This is the first of a series of articles upon the Cement Industry, covering its origin and rapid development. Our Engineering Editor, E. Kuichling, C. E., has been at work for several years collecting data upon this subject as to both foreign and American experience and practice, hence these articles will be of more than usual interest. As we expect to publish them in book form we have taken the trouble to copyright them.—[Editor.

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I also occasionally burn, grind and mix the powder before described with lime, stones, clay, sand or calcined earth, in such proportions as may be necessary and useful for the purpose that the cement is intended to be applied to, always observing that the less water is used the better, and the sooner the mortar or cement is used after being made the stronger and more durable it will be."

Prior to this time, however, similar experiments with limes were published in France by Loriot in 1744, Belidor in 1753 and De la Faye in 1777. Loriot announced that by mixing finely sifted brick-dust, old slaked lime and fine river sand, in the proportions 1, ¾ and 2, into a very wet mortar, and then adding ¾-part of freshly burned and pulverized quicklime, which would be slaked by the surplus water in the said mortar, the resulting product, after being well mixed and quickly used, would harden very rapidly in the air, and would also harden to some extent under water. This latter claim was disputed by Smeaton and others, as it was proved that the mortar did not increase appreciably in hardness after being placed under water, and that it only retained the hardness it had previously acquired.

Belidor, in his large treatise entitled "Architecture Hydraulique," Paris, 1753, describes all the properties of good hydraulic lime, and remarks that stale lime slaked by exposure to the air is of no value for making mortar. He also describes the valuable properties of puzzolana nearly in the same terms used by Vitruvius, and refers to the ancient expedient of using pulverized tiles as a substitute therefor, to be mixed with lime water to aid hardening under water.

Perronet, another distinguished French engineer, who built in 1768 the handsome stone arch bridge over the Seine at Neuilly, a suburb of Paris, specified for use in the foundations and piers a hydraulic mortar composed of 2 parts river sand, ½ part of lime and ½ part of finely pulverized tiles made in the locality, and particularly forbade the contractor from using brick-dust, thus attributing great superiority to the burned clay obtained by pulverizing the tiles.

De la Faye attached great importance to the method of slaking the lime used for making mortar, holding that this is best done by a brief immersion in water, and then allowing it to crumble slowly into powder in a closed cask. He asserts that this process was followed by the ancient Romans, and that the "calx extincta" mentioned by Vitruvius was produced thereby. For making hydraulic mortar, he also recommends the addition of tile dust to the lime. Both he and Loriot believed that they had discovered the lost secret of the Romans in the art of making a strong mortar.

Towards the end of the eighteenth century a very strong water lime was produced in Sweden by burning a certain limestone found at Lena. This stone was analyzed by a French chemist, and found to consist of 90 parts of carbonate of lime, 6 parts of clay and 4 parts of manganese oxide. About the year 1800, De Morveau, of Paris, attempted to imitate this Swedish water lime by making an artificial mixture of finely powdered common limestone, clay and manganese oxide in the same proportions, and on calcining the compound he obtained an excellent hydraulic lime. He attributed the property of hardening under water to the manganese, and asserted that all "lean" limes which exhibited hydraulicity contained this ingredient.

This assertion was strongly disputed in 1807 by the French chemist Vitalis, who analyzed several good hydraulic limestones quarried near Rouen, and found that they were composed of 68 parts of lime, 12 of alumina, 6 of silica, 2 of iron oxide and 12 of water, but contained no manganese whatever. He therefore maintained that the clay alone imparted to the lime the property of setting under water.

Little further progress in cement investigations appears to have been made until 1818, when John and Vicat announced the results of experiments which had been conducted by them entirely independently in Berlin and Paris. Early in that year John presented a paper on lime, cements and mortars to the Dutch Academy of Sciences, giving analyses of many limestones and mortars, and showing that all those which had strong hydraulic properties contained clay, silica, iron and manganese. These substances he called "cement," and asserted that rich or "fat" limes could be greatly improved by the addition thereof. In proof of his contention, he mixed pulverized oyster shells firstly with silicious sand, secondly with various proportions of clay ranging from 10 to 33 per cent., and thirdly with 10 per cent. of manganese oxide, and burned the several different compounds in a kiln for 96 hours. The mixtures of shells with sand and manganese oxide all gave unsatisfactory results, while those made of shells and clay all produced good hydraulic lime.

John thus proved that it was the clay that caused lime to harden under water, and showed how a very good and useful cement could be made artificially. Like Smeaton, he made no further use of his discovery, but left it to others to determine by trial the best proportions of lime and clay for various purposes.

Vicat began his investigations in 1812, but did not publish the results until after John's paper had been presented in 1818. In his treatise, he showed clearly how hydraulic lime could be made artificially by mixing powdered air-slaked lime with a certain quantity of grey or brown clay and water into a paste, which was formed into balls, dried, and then burned in a kiln. If the proportion of clay is only about 10 per cent., the resulting product will have some hydraulicity; but if the proportion is increased to 33 or 40 per cent., the product on being pulverized and moistened will form a paste that sets quickly under water and possesses great strength. Silicious material derived from stones or pebbles in the clay was of no value, and all such matter should be removed therefrom by rendering the clay liquid by agitation with a large quantity of water, and then decanting it from the coarse residue. This "slurry" or liquid clay is to be mixed with the powdered lime and allowed to dry before burning.

Vicat thus shares with John the credit of first demonstrating scientifically the significance of clay in the composition of hydraulic limestones, and how a good hydraulic lime or cement can be made artificially. This credit is usually given by modern writers to Joseph Aspdin, of Leeds, England, but as will be seen below, his work was anticipated fully six years. It is, however, very probable that he pursued his experiments without having any knowledge of the investigations of John and Vicat, and is therefore entitled to a full measure of credit.

A few years after the appearance of Vicat's treatise in

1818, the commercial manufacture of artificial water lime according to his process was begun at Meudon, near Paris; but it was soon found that the material did not equal the natural cements of England in strength and hardness, and that a strong prejudice in favor of the latter existed among builders. Many problems connected with the manufacture still remained unsolved, and hence it is not surprising that other inventors, particularly in England, continued to seek better means of accomplishing the purpose.

In 1822, James Frost, of Finchley, England, obtained a patent for a new cement, made by burning in a kiln "such limestones or marls as are entirely or nearly free from any admixture of alumina or agillaceous earth, and contain 9 to 40 per cent. of silicious earth or silica, or combinations of silica and oxides of iron * * * * The calcined material is to be ground to a fine powder by suitable machinery * * * * When used it is to be mixed with water and tempered to the consistency of common mortar. It should be mixed in small quantities and applied instantly to its intended purpose, as it will set in a few minutes." A singular blunder seems to have been made in drawing this specification, as it was then well understood in England that a calcined mixture of silica or sand and lime did not possess any hydraulic properties; also because Frost actually used a clayey material to mix with his limestones or marls.

On October 21, 1824, Joseph Aspdin, of Leeds, obtained a patent for making hydraulic cement, and described his process as follows: "I take a specific quantity of limestone such as that generally used for making or repairing roads, after it is reduced to a puddle or powder; but if I cannot procure a sufficient quantity of the above from the roads, I obtain the limestone itself; and I cause the puddle or powder or the limestone, as the case may be, to be calcined. I then take a specific quantity of argillaceous earth or clay, and mix them (*i. e.*, the clay and powdered limestone) with water to a state approaching impalpability, either by manual labor or machinery. After this proceeding, I put the above mixture into a slip pan for evaporation, either by the heat of the sun or by submitting it to the action of fire or steam conveyed in flues or pipes under or near the pan, until the water is entirely evaporated. Then I break the said mixture into suitable lumps, and calcine them in a furnace similar to a lime-kiln till the carbonic acid is entirely expelled. The mixture so calcined is to be ground, beat or rolled to a fine powder, and is then in a fit state for making cement or artificial stone. This powder is to be mixed with a sufficient quantity of water to bring it to the consistency of mortar, and thus applied to the purposes wanted."

To the substance thus produced Aspdin gave the name "Portland Cement," on account of the fancied resemblance of the hardened mortar in color, texture and strength, to the öolitic limestone of the island of Portland, which was then and still continues to be a favorite building stone in England; but it must not be understood that Aspdin used this particular kind of stone in his experiments or subsequently in manufacturing cement, or that it was so used by others.

It is very evident that the work done by Aspdin and his predecessors in England and Continental Europe was not extensively known at this time, also that great distrust of such artificial cements prevailed, since in 1826 Gen. C. W. Pasley, of the Corps of Royal Engineers and inspector of the military institute at Chatham, was led solely by the study of Smeaton's observations on limes and cements to undertake a series of experiments for making cement artificially. After many failures he finally succeeded, in 1830, in producing from calcined mixtures of chalk and clay an excellent material on a sufficiently large scale to afford a safe indication of the details and costs of manufacturing it commercially. His attention was then directed to other matters, and on resuming the subject in 1836, he introduced various modifications and improvements in the process, whereby he was enabled to produce artificially a material equal to the best and strongest natural cement of England, as set forth in his treatise published in 1838.

Meanwhile Pasley studied the subject very thoroughly and became familiar with the work done by Vicat and others on the continent, as well as with that which had been done in England; and he "felt persuaded that no artificial cement equal in efficiency to the best water cements of nature, was ever produced until we undertook the task at Chatham." He also expressed the firm conviction that such cement "will in time supersede the most approved hydraulic mortars, both in England and other countries, for works of importance exposed to the violent action of water."

While Pasley was making his experiments, Aspdin and others began to manufacture artificial cement commercially in England, but met with many disappointments on account of the lack of uniformity of their product. By constant perseverance, however, they eventually succeeded in overcoming the more serious difficulties of manipulation, and gradually secured from engineers and builders a substantial recognition of the value of their cement. This seems to have occurred about 1840, and from this time on the cement grew steadily in favor both in England and on the continent. Some attempts at imitation were made in France and Germany, but they were not very successful, and only the English product was preferred for important works until 1855.

The national pride of the French and Germans was at length aroused by the extensive importations of English cement into their respective countries, and strong inducements to improve the domestic cements were offered to the men who had spent much time and money in their manufacture. In France, the quick-setting natural cements of Pouilly and Vassy had been introduced respectively by Lacordaire in 1829 and Gariel in 1831. Both of these were good of their kind, but a demand had been created for a better article, and must be met. Stimulated by the promise of governmental patronage, and aided by the best engineering talent of France, Messrs. Dupont and Demarle established in 1855 the first French plant for the manufacture of a slow-setting Portland cement at Boulogne-sur-Mer, in which locality suitable raw material was found. The work was carried on under the best available scientific supervision, and soon attained such success that a number of other similar plants were built elsewhere. All of these have continued to be prosperous, but have not sought foreign markets for their product.

In Germany, Bleibtreu, of Bonn, was attracted in 1852 to a large deposit of septaria clay near Stettin; and as there

was an abundance of chalk on an island not far distant, he built an experimental plant at Zülchow, and succeeded in producing early in 1854 an artificial cement equal in quality to the best English product. In the following year carefully planned works were built by a private company, and the manufacture of cement began on a large scale under strictly scientific direction in all branches. It quickly became successful, and was soon followed by the erection of numerous other works, until there are now in Germany about one hundred different plants, large and small, having an annual output considerably exceeding that of any other country, and the highest reputation for the uniform excellence of their product.

In our own country the manufacture of good hydraulic lime or natural cement was established very early in the last century, and long before the Portland cement industry began to flourish in England. The excellence of our natural cements and the high cost of making the artificial Portland product, deterred manufacturers for many years from entering this new field of industry; but the superiority of Portland cement was soon recognized by our engineers, and finally David O. Saylor was induced to build an experimental plant for its manufacture at Coplay, Pa., in 1865. After many trials extending over a period of five or six years, he succeeded in producing a fairly good material, and thus started the industry in the United States.

Between 1872 and 1880, five other Portland cement plants of small capacity were erected respectively in Maine, New York, Western Pennsylvania, Michigan and Indiana; but owing to the large costs of manufacture and the imperfect knowledge of the scientific principles involved, three of them were closed, and the industry became inactive until 1885. In that year important changes in the construction of the kilns and methods of working were introduced, and it was then found that high grade Portland cement could be made here at comparatively moderate expense. Since 1890 the industry has been established in many of our States, and has grown with astonishing rapidity, as will be seen by comparing the total annual output of 250,000 barrels in 1889 with the total of nearly 12,000,000 barrels in 1902.

Much more might be said about the history of Portland cement, but it is believed that the salient points have been indicated in the foregoing. Of these, the principal one is the distinctively artificial character of the material, and next, the fact that a good cement of this description can be made anywhere by scientifically combining, burning and grinding a mixture of carbonate of lime and clay of a certain quality.

(To be continued.)

IMPROVEMENT WORK IN WASHINGTON

In discussing the work of the Engineering Department of Washington, D. C., for the last year, Colonel John Biddle, the Engineering Commissioner of the District, stated that the abolition of grade crossings in the city has been vigorously pushed. The new bridge across the Potomac to take the place of the famous Long Bridge, is also nearing completion. The Commissioners of the District and the Secretary of the Treasury, were authorized in June, 1902, to purchase land for a municipal building for the city and to erect a suitable fire-proof structure thereon. The cost of the undertaking was not to exceed $2,000,000. The site has been purchased at a cost of $550,000. Plans and specifications for the building have been under way and it is hoped that the foundations will be commenced by February, 1904, and the contract for the building let during the following summer.

Old brick sidewalks are giving place to those of cement as fast as the majority of the property holders petition for the same, and the appropriations are at hand. The Commissioner hopes to have the walks on all the principal thoroughfares provided with modern cement walks.

The number of trees on the streets is now 87,407 and is increasing at the rate of 2,500 a year. As the appropriations for their care have not been increased, additional funds are asked for.

The work of the Building Department has grown with the increase in buildings and more men are needed to adequately discharge the duties of this Department, which consist in inspection of fire escapes, boilers, heating apparatus, elevators, etc. Two inspectors are not able to do the work.

During the year, eleven miles of water mains and thirty hydrants were added to the distribution service. A new water-tower has been under course of erection and will supply service above the 350-foot level. Two hundred and fifty-five new meters were installed, making a total of 1,748 in the city. While the law provides that the water rates shall never be a source of revenue, the surplus that has remained each year has been devoted to the extension and maintenance of the system and it has not been possible to reduce the rates, as has been desired by many, because of the large surplus. The sources of revenue are from water rates, water main taxes (a special assessment of $1.25 a foot front against property abutting on a street in which the main is laid), and fees for taps and permits. The average water charge on a house is about $7, including large consumers using meters. The rent is calculated on the width and height of the house where water is used for domestic purposes; in the case where large quantities of water are used, meters are installed and the rate is 3 cents per 1,000 gallons. While a complicated method of calculating water rents might be devised that the rents would possibly be more just, the best way to secure uniform justice in water payments, according to the Commissioner, is for the owner of each house to install a meter and so pay for the water actually used.

While the average age of pavement in cities is usually placed at from ten to twelve years, on business streets and from twelve to fifteen years on resident streets, in Washington pavements are expected to last from fifteen to twenty years. The average age of the pavements resurfaced during the past year was slightly over twenty-one years. A large area of paving needs resurfacing to do away with the expensive maintenance costs, but the available funds are not at hand for the work.

CITY WASTE DISPOSAL ABROAD

Method Employed at Sheerness, England—City Water Supply Raised by Power Obtained from Combustion of Refuse—Suggestion for American Cities

By Col. W. F. Morse, Sanitary Engineer

An official souvenir booklet, issued by the Urban District Council of Sheerness, Eng., contains detailed information respecting the recent installation of a waste disposal station, the operation of which is so satisfactory and the results obtained so conclusive, that a brief summary of the statement of the council will be of interest to all American towns confronted in a similar manner with the problem of garbage disposal.

Sheerness, Kent, (15,000 population), is a town on the Thames, a short distance below London. A great ship-building industry formerly flourished there and it is still an important shipping point. When the famous Sheerness Dock Yard was built in 1814, the place was so unhealthy that mechanics had to be compelled to work there.

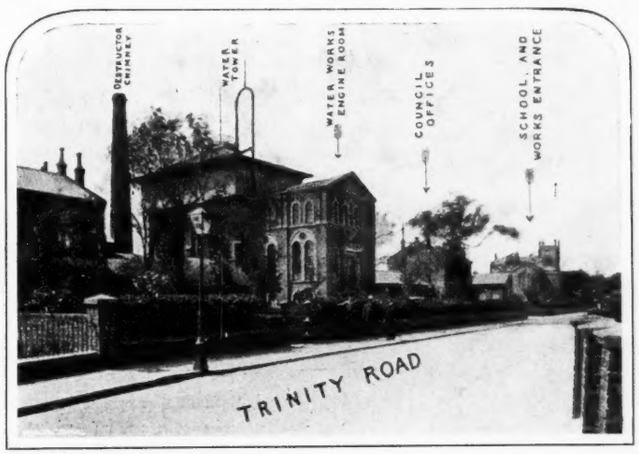

FIG. 1.

Before this installation was made the "town's refuse" (the English term for mixed city waste, consisting of garbage, ashes and combustible rubbish) was collected by a scavenger company, and deposited on dumps a mile and a half out of town, at a cost of 9s. ($2.25) per ton. Three years ago the Urban Council of Sheerness began an examination of other methods of disposal, and, in February 1901, a committee submitted the reports of visits made to several of the well-known destructor plants in England, recommending the Meldrum "Simplex" destructor as being best adapted to the requirements of the Council. Tenders for the furnace and buildings were asked for in May, and in June, 1902, the installation was completed. At the time the report here given was made the plant had been operating seven months, and all that was expected of it was realized in practice. The cost of the destructor and buildings was $17,875.

The location selected for the destructor was immediately adjoining school house and dwellings, and connected with the city water works. It was an unusual location, demanding the display of the utmost skill in the arrangement of the buildings designed to receive the waste, and exacting absolute immunity from offense in its disposal.

Figures 1 and 2 show the location and general construction of the plant, the neighboring offices and dwellings, and the approach to the tipping platform.

The destructor is a Meldrum patent "Simplex" front feed type, with two fibre-grates, having an area of fifty square feet. The boiler is of the Lancashire type, twenty-six feet by seven feet, working at one hundred and twenty pounds pressure. In the down-take is a steam separator, and beyond this a patent regenerator, or air heater, which utilizes the hot gases for heating the air supplied for combustion by forced draft under the fire-bars. This air supply is raised to 350° Fahr., and, as the air is taken from the building, it provides a very efficient ventilating system. The main steam supply is carried direct from the superheater to the engine room of the water works pumping station, and supplied to either engine, as desired.

The practical results of the first six months of operation, as reported by the City Surveyor and Water Works Engineer, Mr. T. F. Berry, are as follows:

"The total daily collection is thirty-five tons of town's refuse, which develops 225 H. P. of steam, applied as auxiliary to the regular equipment of the pumping station. The power obtained from the destruction of the refuse has, in six months, raised a total of fifty million gallons of water. The saving in coal for six months was £156 8s. 6d. ($782.12), which, it is anticipated, will be increased £100 ($500) during the next six months. The saving in transportation of refuse was £260 ($1,300) for six months; the total saving per year will amount to £900 ($4,500). Added to this saving are the profits from the sale and use of the clinkers. One of the good results of this system is the reduction of two pence in the pound of the Council tax rates."

There are three chief points in this report for the information of the government of American cities and towns:

First, the cost of the whole installation is about one-half as much more as would be required for a disposal plant developing no power.

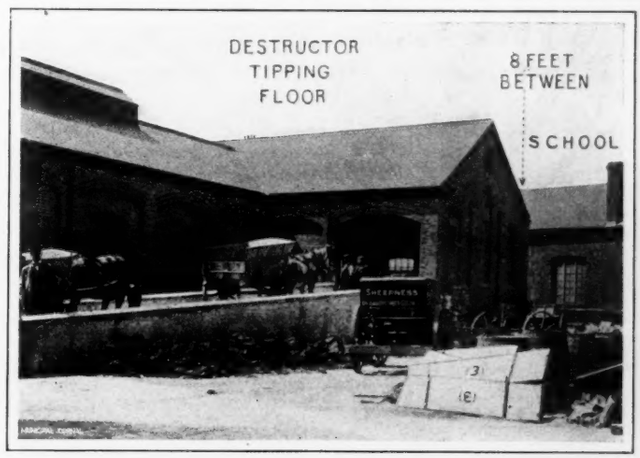

FIG. 2.

Second, the location of the plant is in the middle of the

town, which effects a saving in transportation, and provides for the utilization of the heat in municipal work to the fullest extent.

Third, no fuel other than the material to be destroyed is required for the operation of the destructor and the high temperature obtained by the use of the Meldrum apparatus effectually destroys all noxious odors.

This installation is a striking object lesson to other communities, proving conclusively that a first-class destructor, contained within suitable buildings, may be erected on the most central sites and be operated with entire freedom from nuisance.

The relative conditions of garbage and refuse collection in American and in English cities do not vary in a radical degree. Two people with similar habits, and the same methods of waste production and collection may dispose of their wastes in the same manner, and enjoy the same gratifying results.

It is a question of a means to an end, and in this case it is obvious that the end fully justifies the means.

THE BITULITHIC PAVEMENT

One Engineer's Experience in Laying It and the Opinions of Many Others—Methods of Construction

By W. A. Hoyt, C. E.

A THOROUGH exposition of the bitulithic pavement is not attempted in this paper. The five weeks allowed me for its preparation is too short a time, even if I possessed the ability, to investigate technical details, and to show the evolution, interesting as it might be, of this form of pavement. I therefore give observations and conclusions I have gathered, in superintending the construction of about 55,000 square yards of this pavement, during the past summer, for the cities of Kalamazoo and Manistee, Michigan; in a short correspondence with others who have had a similar, or a greater opportunity for observation, and in a study of available literature upon the subject.

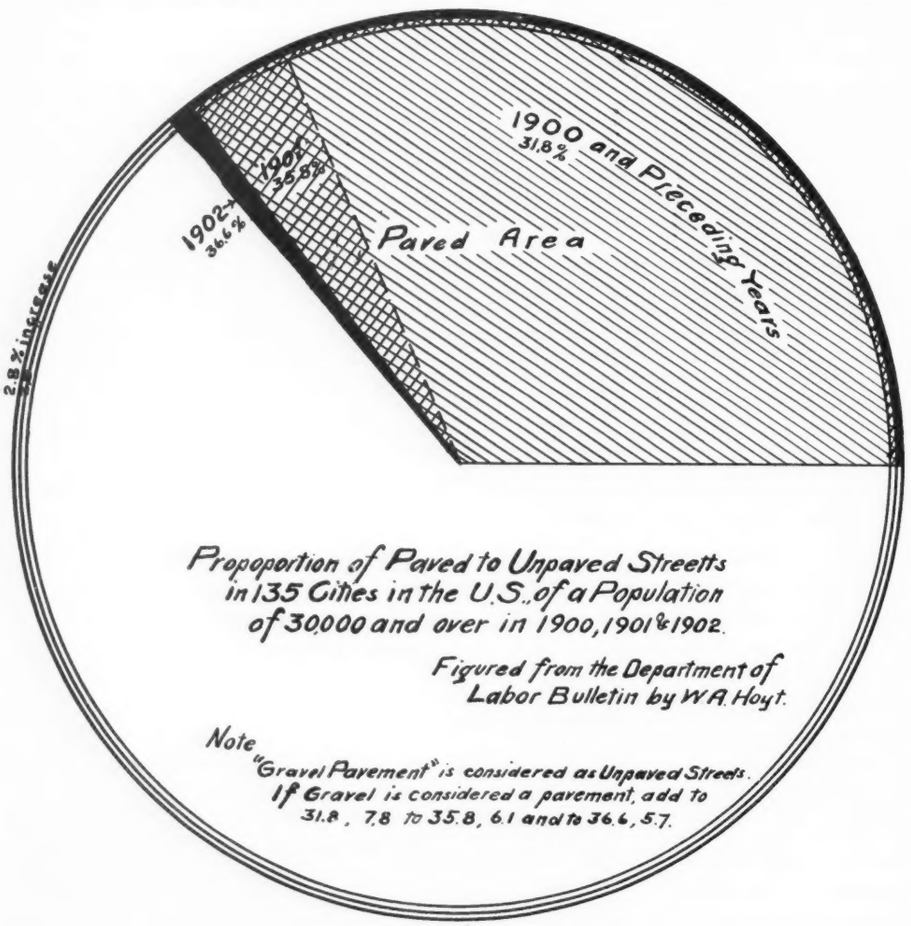
1900 and Preceding Years
31.8%
1901
35.8%
1902
36.6%
2.8% increase
Paved Area
Propoportion of Paved to Unpaved Streetts
in 135 Cities in the U.S., of a Population
of 30,000 and over in 1900, 1901 & 1902.
Figured from the Department of
Labor Bulletin by W.A. Hoyt.
Note
"Gravel Pavement" is considered as Unpaved Streets.
If Gravel is considered a pavement, add to
31.8, 7.8 to 35.8, 6.1 and to 36.6, 5.7.

DIAGRAM NO. I

LOOKING FOR THE BEST PAVEMENT

I wish to say at the outset, that I am not interested in the promotion of any kind of pavement whatsoever, except the one which, by merit alone, proves its right to promotion. The purpose of the paper is to bring out weak points as well as strong ones. If I err in my judgment it is because of the lack of acumen, and not because of the lack of the spirit of inquiry.

The need of thorough investigation and correct conclusion on the paving question is certainly great; greater, perhaps, than some of us realize. A few statements in this connection may not be out of place. At this time (1904), 50 per cent. of the population of the United States live in incorporated towns and are, therefore, directly interested in the question of a cheap and durable pavement.

Bulletin No. 42 of the Department of Labor at Washington, issued September, 1902, gives, for the 137 cities in the United States with a population of 30,000 and over, a total of 36,930 miles of streets of which 37 per cent. only are paved.

These cities contain one-fourth the population of the United States, which pay, according to Mr. S. Whinery, M. Am. Soc. C. E., about $2.50 per capita for paving purposes

* This paper was prepared after most painstaking efforts to get the facts in the case, and read by W. A. Hoyt, C. E., construction engineer for the Commissioners of Public Improvements, Kalamazoo, Mich., before the Michigan Society of Civil Engineers, at its convention at Lansing, Mich., Jan. 15, 1904, and here published with the permission of the author. Mr. Hoyt is a graduate, civil engineering course, of the University of Wisconsin, and was formerly assistant city engineer of Providence, R. I., and Altoona, Pa. He also spent a short time on railway work in Colorado and Ontario, Canada.—[EDITOR.

annually. This is no small sum and it is increasing each year as the demand for more and better pavements increases. The electric road and bicycle, the popularizing of modern ideas of civic art, the problem of the "submerged tenth" and sanitation, are expansive forces whose dynamics we have scarcely yet begun to feel. With all these forces, the question of pavements is vitally connected.

It is seen from Diagram No. 2 that asphalt, after macadam, is the most popular pavement. Therefore, as the bitulithic pavement combines the two, attempting to eliminate the bad features of each, and to combine the good features, it would appear that it had a good vantage ground of attack.

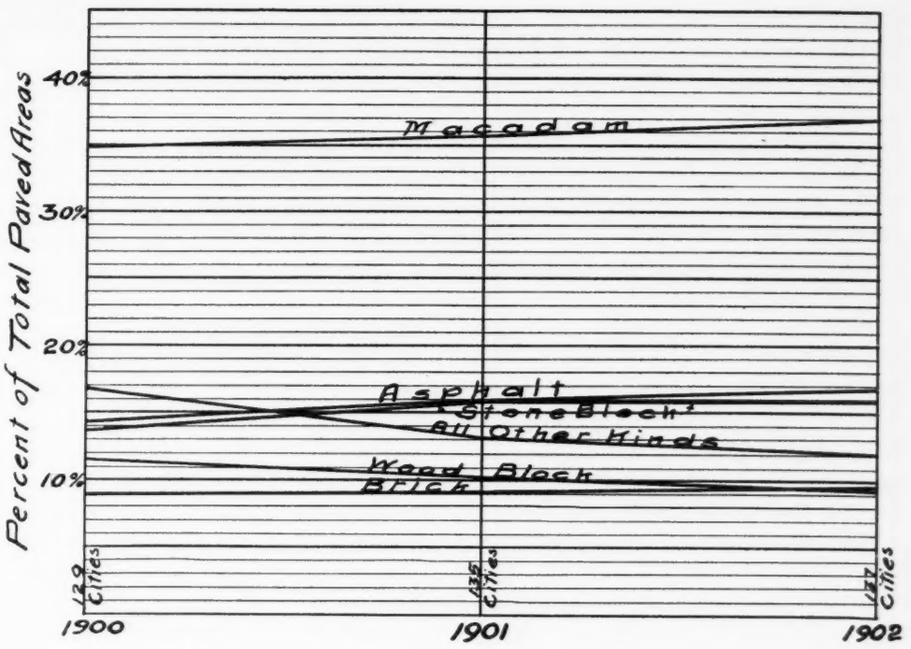

DIAGRAM NO. 2

Gives percentage of each kind of pavement in use for 1900, 1901, 1902, and shows increase or decrease in popularity of the paving materials.

The legitimate predecessor of the bitulithic pavement, and with which the public so naturally confuse it, is the coal tar pavement. The history of this pavement is very erratic, with peculiar successes and disastrous failures. Tar macadam pavements were used in Paris, in 1854, and they have been used in other European cities for many years. They began to be used in this country about 1866. Mr. Tilson, in his "Pavements and Paving Materials," speaks of a few of these pavements in Brooklyn and elsewhere, which have lasted for over twenty years. The experience of Washington, D. C., affords the best opportunity for the study of coal tar pavements. From 1871 to 1888 there were laid 864,400 square yards of this pavement, all essentially the same, in the use of the broken stone base coated with tar and a wearing surface of varying thickness and composition, depending upon the patent under which it was constructed. In all the pavements, coal tar was used either crude or partly refined, and either alone or mixed with sawdust, sulphur, sulphuric acid, slacked lime or asphalt, or a combination of several of these materials. Of these pavements something like 20 per cent. of the total yardage failed in two or three years, about 50 per cent. in seven years, and 91 per cent. in fifteen years. While 4.9 per cent. lasted for twenty-six years and 1.2 per cent. for thirty years. The average annual cost, for repairing these streets which have lasted for thirty years and over, is very low—about 2.2 cents per square yard.

First Methods Used in Coal Tar Pavements

The method of construction was very crude. At first the tar and stone were mixed cold and later were mixed hot, the stone was heated on a drying floor and the tar in kettles, and mixed with shovels as concrete. Still later when mechanical mixers were used there was no uniformity in the tar or attempted gradation of the stone. Mr. A. W. Dow, Government Inspector of Asphalts and Cements, says that in all pavements of "this class, which lasted well, no material except refined coal tar was used as the cementing agent, with, in some instances, the addition of a little asphalt; and those pavements in existence to-day were all laid with straight refined coal tar." He further says that the long life of these old pavements "can only be looked upon as a lucky accident," and for this reason "it is a remarkable illustration of what coal tar bitumen can do by chance."

Despite these failures coal tar pavements continue to be used and in the last few years have become quite popular in Canada. Some of the places repeated the same mistakes as were made at Washington. Hamilton and Toronto have been using it in increasing amounts for several years. These pavements appear to give satisfaction in many cases and cost from 40 cents to $1.25 per square yard.

The unusual wearing qualities of some of these old pavements attracted the attention of men interested in the paving business. While at the same time the conditions of the asphalt trade, and some difficult features connected with that construction caused men to seek for some other form of pavement.

Mr. S. Whinery, M. Am. Soc. C. E., for several years in the asphalt paving business, advocated, in 1901, an asphalt macadam pavement, which would combine the low cost and non-slippery features of the macadam, with the smooth hard surface, noiselessness and sanitary features of the asphalt pavement. Thus he thought to obtain a pavement which would not be dusty and "ravel" as macadam, and would not be slippery, and crack and shift and "scale" as asphalt. He considered the combination more durable than asphalt, as the use of stone would prevent the concentrated loads from causing it to scale as asphalt, and would allow the use of a greater per cent. of bitumen in the binding material, thus giving the pavement a longer life. In June, of this same year, Mr. F. J. Warren took out his patent for a bituminous macadam pavement based on the same general line of reasoning. He had made a study of the old coal tar pavements

and proposed to use a coal tar pitch for the binder, and a graded stone for the metal.

After we have heard the *practical,* we will be better able to study the *theory* of this pavement.

METHOD OF CONSTRUCTION

The *subgrade and foundation* will not be taken up in detail as the work is nearly identical with that of the macadam pavement, with which all are familiar, except only to mention a matter which caused great consternation amongst the "curbstone engineers." The sand came through the stone so badly that we began the use of a light sprinkling of coarse hay upon the subgrade. This hay, in large quantities, would help the rolling of the subgrade, and a light layer being left, it kept the sand down considerably. It was not permitted in bunches or upon questionably spongy soil.

Usually a six-inch macadam base is used, the stone varying in size from that which will pass a three-inch ring to that held on a one-inch ring. This should be thoroughly rolled so as not to ridge or shift under a fifteen-ton roller. If necessary to bind the stone, a light coat of smaller sizes should be used. Smooth places caused by the concentration of fine stone and dust are not desirable. If sand, mud or clay works up through, it should be cut out, replaced with stone and rolled until solid. When the rolling is finished the surface should have a uniform grade, the thickness of the wearing coat below finished grade, over the entire surface. This point should be watched and a variation of one-half inch should be the maximum. The spreader in charge of forming the surface, should have two eyes and a judgment and know how to use them.

Upon this foundation is spread a light sprinkling of what is called "Warren's No. 1 Puritan Brand Semi-Liquid Bituminous Cement." Upon this is then uniformly spread a coating of No. 24 bituminous cement. To coat the stone entirely it requires about one gallon per square yard, which amount is stipulated in the specifications.

The *wearing surface* is ordinarily two inches thick after compression. It is composed of granite or hard field stone varying in size from 1¾ inches to an impalpable powder, with stone dust or hydraulic cement and a bituminous cement. The stone is heated in rotary dryers, elevated, passed through the screens which separate the six different sizes of which it is composed; weighed into a mixing box, dumped into the "twin plug" mechanical mixer and mixed with the hot bitumen, then dumped into wagons and hauled to the

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OPINIONS OF THE BITULITHIC PAVEMENT FROM CITY ENGINEERS AND MAYORS

of 75 per cent. of the Cities in which it has been laid to January 1, 1904.

Index No.*	Year Laid	Durability	Satisfaction giving	Comparison with asphalt	Other remarks
1	1903	Good if properly laid	Rough, wavy surface	Not so pretty	Surface not properly rolled
2	1902	Greatest of all	Best possible		
3	1902	Indications good	Favored by all	Preferable	
4	1902	Has come to stay	General approval	Far superior	The most up to date
5	1901	An excellent pavement	On the whole satisfactory		Laid directly against T rails. Flange tore up chunks
6	1902		Very satisfactory	Surpasses expectations	City puts up foundation
7	1902	No signs deterioration and few signs of wear	Good		Light traffic
8	1901	Prefer to reserve opinion	Liked best of all		None which comes nearer the ideal
9	1901	Some not wearing well	Some fine condition		Faulty construction
10	1902	Better than when laid	Most excellent		
12	1901	Greatest of sheet pavements	Best pavement known	Ample means for comparison	Light and heavy traffic
13	1903	Think it will wear well	Good	Rougher	May wear rougher
14	1903	All that could be desired		Decidedly superior	
15	1902	Stands hard usage well	Heartily approved		Slippery at first
16	1902	No failure yet	Good	Less slippery	Some unevenness in composition due probably to green men
17	1902	Stood extremely well	Approved by all		Traffic heavy
18	1902	No sign of decay or defect	Thoroughly good		Property owners calling for more
19	1902	In excess of any other	Best pavement known if properly laid		Must not be chilled
20	1903			Not yet able to express an opinion	
21	1903		Can say more in the spring		
22	1903	Good as far as I know	Good	No experience	Wavy surface
23	1903	Probably greater than any other in the city		Ideal pavement	
24	1902	Ought to be good	Good so far	Especially desirable for residence streets	
25	1902	Every indication good	Under favorable conditions satisfactory		Wet subgrade
26	1903	Will resist wear in a great degree		One of the best	Least inconvenience to the public in construction
27	1903	No opinion	Entirely so	Not slippery	9 to 13 per cent. grade
28	1903	Entirely so to date			More skill required than in others
29	1903	Cannot say	All that could be desired	Well pleased	
30	1903	Cannot say	Thoroughly satisfied	Not slippery	Fire department prefer it
31	1902		Best we have	Only brick in use	
32	1902		A trifle soft at first but not sticky	Safest and easiest	Hose cart drivers prefer it
33	1902	No weak points; expect none	Satisfactory to all	Not so slippery	Good on steep grades
34	1901	Absolutely no sign of wear. Promises many years of wear	But one opinion; will have no other pavement	Absolutely no competitor here (No sheet asphalt)	Some laid in a bog. (See letter.)
35	1902	Must have test of time	Inclined to believe it a good pavement		
39	1903		Improper surface, as it is almost as slippery as asphalt	The equal of asphalt	
40	1902	Time too short to judge	General satisfaction		Consider it scientific
41	1902	No creeping in hot or cracking in cold weather			Must not be chilled
42	1903	Worn extremely well	Good	More slippery	
43	1901	Shows ordinary wear	Well satisfied		On steep grade
45	1902	Shall use it extensively	Eminently satisfactory	Has all its good qualities and not slippery	Heavy traffic
47	1902	$100,000 voted at public meeting for more of this pavement	No hesitation in recommending this as the best for our city		
48	1902		Generally good	Soft in summer, not so slippery in winter	

* Index numbers 11, 36, 37, 38, 44, and 46 were omitted because no responses were received from these places

street. When this is shoveled from the platform, upon which it is dumped, and spread upon the street, it should not be thrown, but deposited where wanted as concrete. Much depends upon the rakers who spread the material, after it is deposited in place by the shovelers, to keep uniformity in the mixture and to get a uniform surface, by filling up irregularities left in the foundation or caused by subsequent settlement in rolling the surface. The rolling should follow closely upon the spreading of the material.

Upon this wearing surface is then spread a thin flush coat of bituminous cement, just sufficient and no more, to fill any honeycomb which may exist. The amount required varies with the irregularities of the surface and the amount of the rolling it gets before cooling. Too much, especially in cold weather, is worse than not enough. Over this is spread a light coat of stone chips, of a size depending upon the roughness of surface desired and rolled in. These successive layers should follow sufficiently close upon each other to allow the surface to receive its full amount of rolling before it becomes cold. This time will vary greatly, depending upon the conditions of the weather. Much depends upon the rolling to make the surface dense by wedging the stone together and by forcing out air bubbles. The first rolling of the wearing surface should be lengthwise of the street, but it should be gone over diagonally before the rolling is finished. The weight of the roller should not be less than fifteen tons, with a 20-inch rear wheel, which gives a compression of 450 pounds per inch width of wheel. Loads of 1,000 pounds are frequent and they sometimes run up to twice that amount.

All the bituminous material from the first that is applied to the last sprinkling of stone chips should be heated, and all, except the No. 1 bituminous composition, should be applied to the street at between 200 degrees and 250 degrees F., but none, not even the stone chips, should be heated over 275 degrees F.

Each layer should be kept free from dirt and moisture. It is best to suspend work during wet weather, and to stop work when the thermometer reaches 25 or 30 degrees F.

Difficulties encountered in the foundation work are those common to macadam pavements. Sand and mud should not be permitted to fill the voids in the foundation stone. The only real difficulty that I experienced, and I find the same difficulty with others, was in getting a uniform surface. If the crown is low (less than five inches for a thirty-foot street, or six inches for a forty-foot street) or the grades are flat (less than 0.33 per cent.) great care must be taken to avoid small pools of water and to make the gutters drain. Under the repeated rolling, slight settlements may take place. An apparently solid subgrade may get wet and "churn up" and make the surface spongy and uneven, which may necessitate cutting out the pavement or burning down and building up the surface. Slightly spongy spots tighten up after a few days and appear to be satisfactory. Small depressions should be kept less than 3/8 of an inch under a four-foot straight edge and long swells, aside from the gutters, within 1/2 an inch from established grade.

Materials of Construction

Stone for the base is selected on the same principle as for macadam. It should be sound, hard stone, not friable under the roller. The scare which some would-be wise heads sometimes succeed in creating about lime stone disintegrating in the foundation is entirely unfounded. Mr. Page, Chief of the Road Material Laboratory of the Department of Agriculture, Washington, D. C., speaks as follows upon this subject:

"All rain and surface water contain a sufficient amount of carbonic acid to dissolve carbonate of lime and iron, and when charged with the humus acids derived from the decomposition of animal and vegetable matter, certain of the rock-making minerals containing magnesia, potash, soda, lime, iron, and even silica are rendered soluble. There is also a small amount of sulphuric acid present in rain water in the vicinity of large cities. The rocks most effected by these regents are the lime stones and rocks having a matrix of lime and iron, but we find the resulting disintegration in rocks likely to be used in road making, practically negligible when compared with that due to other agencies which roads are subjected. Even with roads constructed with the most soluble rocks it can be seen that this action from a road building standpoint is extremely slow."

Mr. Page is here speaking of macadam roads, where the stone is subjected to the action of running water much greater than with the bitulithic pavement. The effect of frost upon a porous stone, in the foundation, would be extremely small, as there is ample room for drainage and expansion. Of course it is better to have a hard stone so it will last for several re-surfacings.

(To be concluded in March number.)

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THE SKYLINE OF DETROIT—VIEW TAKEN FROM THE RIVER

NATIONAL CONGRESS OF GOOD ROADS

State Highway Commissioner MacDonald of Connecticut Host of American Road Makers and Good Roads Advocates at Hartford, Feb. 10-11, Second Annual Meeting of A. R. M.

By the Secretary

HON. H. S. EARLE

THE progress in the good roads agitation since the last meeting of the American Road Makers at Detroit, Mich., a year ago has been something phenomenal. Not only has the work gone on with greater success than ever in the pioneer States of New Jersey, Connecticut, New York and Massachusetts, but the State of Pennsylvania has come to the front and taken its stand with other progressive States in the Union by passing a State law which will do much toward improving the highways of the Keystone State. Michigan, the home of the President of the A. R. M., under his leadership has finally passed a law creating a State Highway Department, and Governor Bliss has honored his State and the cause by making the Hon. Horatio S. Earle the first executive of the new Highway Department. Similar advances have been made in the Southern, Southwestern and Western States, not to mention the progress that has been made by our Canadian cousins across the border.

State Highway Commissioner MacDonald of Connecticut has finally succeeded in persuading the last two towns of his State to come into his scheme for highway improvement. The plan for improving good roads in Connecticut differs from that of any other State in the Union and is original with Commissioner MacDonald. From the time of its conception the sentiment favoring highway improvement in the Nutmeg State has grown steadily until last fall the last towns were brought to see the error of their ways through the persuasive eloquence of the Commissioner and now he has a united family and expects greater things than ever under this reign of harmony. It is particularly fitting, therefore, that this Good Roads Congress should be held at Hartford this year. At the suggestion of Commissioner MacDonald, Governor Chamberlain of Connecticut sent the following letter to the chief executive of all the States and territories in the Union:

"My Dear Sir: A congress of men officially employed or interested in the art of road building, will be held in the Assembly Chamber of the State Capitol at Hartford, Conn., February 10th and 11th, 1904, in connection with the national convention of American Road Makers; and I most respectfully request that you appoint five delegates to attend said congress.

"This convention will be one of the most notable gatherings of its kind ever held in the United States. Attendant upon the convention will be men of national reputation in expert road making, who have made the art of road building a study both from an economic point of view and under the most improved methods. The value of their experience and education will be of incalculable benefit to all those who may attend the convention.

"This great question of road improvement has asserted itself and is one of the paramount issues of the hour. The sentiment for better roads has grown very rapidly and the 20th century finds inaugurated successfully in many States of the Union an intelligent and helpful plan under which to make highway improvement within the reach of all, and every day the sentiment for a betterment of the highways of the land is growing in the minds of the people of this country.

"The reason for calling this convention is to bring together the brightest minds and the largest and best experience to be found in the United States on this subject, with the object in view of disseminating the knowledge thus gained throughout the length and breadth of the land.

"I am only too happy to second the efforts of the gentlemen having charge of this great convention by any effort on my part leading up to as large an attendance as possible; and with this end in view I most respectfully ask that you will take the matter up and appoint five delegates to attend this convention. If the purpose or object of this meeting is agreeable to you you will kindly appoint five delegates and send their names to W. S. Crandall, Secretary of the American Road Makers, 253 Broadway, New York City; they will then be enrolled on the list of delegates."

Since the mailing of the foregoing letter responses have been received from nearly every State and territory, and many enthusiastic expressions of approval and good wishes for the success of the congress have been extended by the Governors when in sending their list of appointees. It is fully expected that this congress will be the most important meeting of the year on the subject of good roads.

The citizens of Hartford have come to the front and appointed committees to suitably entertain and care for the several hundred distinguished guests that will be in attendance at the meeting, which will include among other items, an automobile ride about the city; a large banquet, at which covers will be laid for five hundred. The responses already received indicate that the attendance at this meeting will be three or four times that of the Detroit meeting, which in itself was the greatest road meeting ever held in this country.

It is intended to have the first day of the convention devoted to the question of State highway improvement and a discussion of the advisability of securing national aid. The second day will be devoted chiefly to the discussion of municipal improvements, especially in their relationship to this great question of highway improvement. The proceedings

will consist of addresses by mayors of different cities, directors of public works, boards of public works, heads of departments, street committees, etc. This wide range of important matters connected with the whole subject of highway improvement will furnish no end of information and valuable data to all delegates who may attend.

The convention will be opened at 12 o'clock, sharp (eastern time), Feb. 10th, by an address of welcome in behalf of the State of Connecticut, by His Excellency, Abiram Chamberlain, Governor; and an address of welcome in behalf of the city of Hartford by his Honor, Ignatius A. Sullivan, Mayor.

Arrangements have been made with all railroad companies whereby a reduction of fare will be made to all delegates presenting the proper credentials. Said credentials, or certificates, will be issued at the station from which the delegate purchases his ticket to Hartford. BE SURE AND GET SAID CERTIFICATE. The rebate will be made at Hartford on the return ticket. Hotel accommodations in the city of Hartford are ample and all rates are reasonable. The hotels are first class in every respect. Any delegates desiring hotel accommodations may have the same reserved for them by sending a letter to Hon. James H. MacDonald, State Highway Commissioner, Hartford, Conn.

EXCELLENT REPORT OF TORONTO'S CITY ENGINEER

One of the best reports of an engineering department that has ever come to hand is the late report of City Engineer C. H. Rust, of Toronto, Ont. While the report takes up some 129 pages, there is no dead wood in it. A brief summary of statistics of the city—matter that all other city officials wish to know that they may judge properly of the conditions—appears first after the index. Then comes the report of Engineer Rust on the department of public works. In this Mr. Rust regretted that the overhead wires still disfigure the streets and unsightly signs are so much in evidence. While plans were made to install a sewage disposal plant that the waters of the lake might not be polluted, property owners refused to sanction the cost. He suggested that a wide boulevard be constructed along the Lake shore, to fill in which street sweepings could be employed at a saving on haulage. A garbage and refuse destructor has proved satisfactory "and is a decided improvement over the old method of burying all night soil, garbage, etc."

During the year, 17.41 miles of pavement and 27.4 miles of concrete and brick walks were constructed,—the largest amount of work of this kind done in any year so far. Because of the difficulty in securing stone, Mr. Rust suggested that the city own and operate a stone quarry. The department continued the practice of bidding on all contracts and was the lowest on fifty-one. At the beginning of the year, only two companies were bidding on asphalt paving, both using Trinidad Lake asphalt, but a new firm entered the lists during the year, bids being submitted for Warren's Acme California asphalt. "The advent of the new company resulted in a very large decrease in the cost of constructing asphalt pavements."

The construction of brick walks was limited, concrete walks being considered much superior as well as being cheaper to build. Only a little over a mile of sewer was laid, making a total of 234.53 miles in the city. The cost of repairs to macadam roads ranged from 9.5 to 29.5 cents per square yard. Detailed reports concerning all of the work of the department is set forth in the reports of the assistant engineers and the Street Commissioner, Mr. John Jones. From the report of the engineer having charge of the pavements, it appears that asphalt paving forms 15.3 per cent. of the total length of all streets, being 39.983 miles. A total length of 5.237 miles of asphalt was laid, or 30 per cent. of all paving put down in 1902. Brick pavements were laid to the amount of 38,993 square yards. All the pavements were constructed with concrete foundations and stone curbs, the old style gravel foundations and wooden curbs having been done away with.

During the winter, 312 linear miles of walk were cleared of snow at a cost of four mills per linear foot. The total milage of street cleaning, according to the report of Street Commissioner Jones, was 1,597. For street cleaning, maintenance of plant, etc., the cost was $39,389.19; for removing snow, including one-third of the cost of removal from railway tracks (the city's share), the cost was $10,699.14; for asphalt patrol cleaning from May to November, the cost was $21,968.82. A comparison of Toronto with a number of American cities in respect to street cleaning cost appears in a table.

In the report appears also Mr. Rust's report on the Water Works, of which he is Chief Engineer and Manager, and includes numerous schedules of pumpage, consumption, etc.

The reports are accompanied with numerous tables showing in detail what has been done in the departments, the cost of laying pavements, etc. Diagrams of the standard cross sections of pavements as required by the department and illustrations of some of the paving work under construction accompany the report.

MUNICIPAL JOURNAL AND ENGINEER

Published Monthly by

THE MUNICIPAL JOURNAL PUBLISHING COMPANY

253 Broadway, New York

WILLIAM S. CRANDALL, - - - - - - - Managing Editor
WEBSTER WAGNER, - - - - - - - - - Assistant Editor
EMIL KUICHLING, C. E., - - - - - - - Engineering Editor

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TERMS OF SUBSCRIPTION

(Payable in Advance)

United States and Canada	$3.00 per year
Foreign Countries	3.00 "
Single Copies, each	.25

Special rates given for clubs of ten or more.

Make all checks payable to The Municipal Journal Publishing Company

Entered at the New York Post Office as second-class matter

NEW YORK, FEBRUARY, 1904

A Good Word for Brick Pavement from Seattle

In reply to a letter from Mayor Olney, of Oakland, Cal., City Engineer Thompson, of Seattle, Wash., who is recognized as one of the most able men in his profession, had the following good report to give about the brick pavements of his city and at the same time contributed some of his valuable experience obtained in the building of brick pavements. He said in part:

"We have, in our city, quite a number of miles of brick pavement, which has been very satisfactory. One block of pavement in the heaviest traveled portion of the city was laid a little more than ten years ago. This block is still in service and in excellent condition. Eight years ago, the pavement was laid on Pike street. This street has a good deal of trotting traffic upon it. Sharp-shod, rather small sized horses, attached to butchers' carts and delivery wagons, and things of this kind, pass with great frequency up and down this street. This class of traffic is very much more injurious to pavement than the very heavy trucking which passes over the block in the central portion of the city, and for that reason the pavement laid eight years ago, although of equal material to that laid ten years ago, is not in quite so good condition.

"The brick must be very uniform in size, that is to say, in thickness and in depth. The matter of length is not very material. If the bricks are not of the same thickness you cannot bind them uniformly one against the other in the pavement; and if they are not of the same depth they cannot be bedded uniformly so as to give a smooth top. On the level, or reasonably level, streets we have the edges of our paving brick almost square, and when laid there is almost absolutely no joint between them. It is this class of pavement which wears the longest and gives the best service. On streets of considerable grade, we bevel the edges of the brick so that there will be given toe-hold to the caulks of horses compelled to climb these streets. This beveling, of course, converts that class of brick into an improved form of cobblestone. Where the brick are of absolutely uniform depth, the pavement, at the beginning, even though beveled, is very quiet; but, as time passes on, the beveled brick wear more and more round; the corners spalling off by the strikes of the caulks of the horses; the fact that they are beveled, separating the edges from the adjacent brick, makes it more easy for the horse's caulk to ship off the small spall, and thus, from day to day, by imperceptible degrees, they become more and more round topped, and finally, after six or eight years, become quite noisy.

"The cost of a brick pavement in our country is about 10 per cent. more than asphalt, and under heavy service we consider it much the better; but, with both asphalt and brick, that traffic which most destroys is generally the trotting traffic of the sharp caulked horses. In a warmer climate, that is possibly not so severe on asphalt as in a cooler climate; and in a level country there will doubtless be less caulks than in a country of such hills as we have. Our brick cost us, delivered on the ground ready for use as pavers, from $18 to $20 per 1,000."

Safeguarding Theatres

Thirty days ago the Iroquois Theatre in Chicago was destroyed by fire during a matinee performance and five hundred and sixty-five dead bodies were taken from the ruins, while subsequent deaths due to injuries received and those unaccounted for swelled this number to over six hundred. Naturally enough the horror of the disaster impressed itself on the whole world and the city officials in all the leading cities started immediate investigations, to ascertain if their play houses were in a reasonably safe condition. In a majority of such cases adequate provisions for the safety of patrons were lacking and, in many instances the safety of the public was so grossly ignored that the theatres were closed and not allowed to re-open until proper safeguards were provided.

Already the event has lost much of its horrible aspect and officials are becoming lax in doing their full duty, and in another month or two it will have passed out of the thought of the general public. But even if the terrible tragedy is forgotten by the public, the city officials should see to it that certain reasonable regulations, governing the construction and equipment of all theatres, are made and rigidly enforced. *The Outlook,* of New York, in an editorial upon "The Chicago Tragedy" specified a number of precautions which we consider reasonable:

"First, it ought to be made a misdemeanor in any place of entertainment to sell more tickets than there are seats. The sign 'No Standing Room' ought to be printed on every ticket sold by the theatre.

"Second, there ought to be in every theatre, exits in proportion to the seating capacity, so that every public place where crowds assemble can be safely emptied of its occu-

pants in from three to five minutes. These exits ought to be distinctly marked, they ought to be solidly and properly built, easily accessible, and always in order for use. An exit which is locked so that it cannot be used until the usher is found, is worthless. The suggestion that at the close of every performance all the exits should be thrown open so that audiences may become accustomed in every place of amusement to all the ways of egress, ought to be given a trial.

"Third, no wood should be used in the building of any structures in which audiences are to be assembled. All scenery, ropes and other apparatus on the stage should be fireproof. This is easily done, does not involve great expense, and would prevent the great majority of fires in theatres.

"Fourth, inspection ought not only to be impartial and exacting, but regular and frequent, so that the responsible department will know from day to day the condition of every theatre under his supervision. This will avoid the possibility of the failure of the safety apparatus to work. If the asbestos curtain is let down every day, there will be no trouble about lowering it in an emergency.

"Fifth, there is now on the stage of most theatres a fireman who watches the scenery and is ready to help in case of emergency. In many French theatres two firemen are in view of the audience with hose in hand, ready to turn a stream of water at a second's notice on any part of of the house. This is a precaution which might well be adopted in American theatres.

"Sixth, in every place of public assembly there ought to be an organization which should instantly take charge of the crowd in case of danger. The great peril is not fire but panic, and panic is the result of the absence of leadership. A panic can almost always be arrested in its initial stages by one commanding voice. It is the absence of any organization which makes the panic possible. There ought to be in every place of public assemblage an organization which could instantly take charge of the crowd in case of danger. This might be done by the firemen who should be regularly stationed at the exits, by police detailed for every theatre, or by trained ushers who would instantly throw open every egress and direct the crowd.

"Seventh, there ought to be no possibility of adding the horror and danger of darkness to the perils of fire. Hundreds perished in the Chicago disaster because they were caught in narrow passages in total darkness. The red lights which indicate the exits, ought to be provided for by an independent circuit, and some other form of light ought to be always burning in every theatre to provide against the emergency of the cutting off of electricity."

Foolish Opposition to Water Meters

THE city authorities of Norfolk, Va., have long deferred to correct the tendency of water waste in their city and also to increase its supply. It seems that the Seventh Ward of that city is served by a private corporation. This corporation has reached the point where forbearance has ceased to be a virtue in the matter of permitting water waste to continue. It has, therefore, matured a plan whereby it will soon install water meters on all the domestic services within its territory. The residents of this ward very foolishly propose to resist this effort on the part of the Water Company to prevent waste, and they have indicated their intention to fight the installation of meters, and if necessary to enjoin the company from installing meters.

These people are ignorant of the real merits of the water meter or they would not take any such stand, and yet there are thousands of others, including many city officials, who are as totally ignorant of the benefactions of the water meter to the consumer. If a reasonable charge is made for water service the installation of meters upon any domestic service could not fail to work to the benefit of all concerned.

Street Car Fatalities in New York City

IN the year 1902, according to a report of Police Commissioner Greene, given out just prior to his retirement from office, 336 persons were killed by vehicles in the streets of New York. Of the total number of deaths, 172 were caused by street cars; that is, the street car companies of New York killed some person every other day in the year 1902. The number of fatalities could hardly be less in 1903, and it is reasonable to suppose that with the increasing congestion in New York streets a still larger number will be killed in 1904.

Nearly all of the deaths caused by street cars could have been avoided if the street car companies had been obliged by the city authorities to equip their cars with suitable fenders. We have repeatedly called attention to the fact that while some of the street car lines of Greater New York are properly equipped with life preserving fenders, there are thousands of cars, including those of Brooklyn, which are supplied with a home-made affair that is more dangerous than no fender at all.

The city authorities in the United States are altogether too heedless in administering the affairs of American municipalities. They seem to have no regard for human life. Corporations rule the cities through the city officials. There are a few notable exceptions; we believe there would be many more if city officials only realized how firmly they might intrench themselves in the regard of the public if they would give more attention to defending the people in their rights. It is up to the mayor to correct this particular abuse for he can institute an investigation that will bring about the correction of this evil in any city, but in case a mayor in any city remains indifferent it is possible for an alderman, by introducing a proper resolution to start an investigation which will ultimately result in the correction of this street car evil.

Editorial Comment

BUFFALO now pays seventy-five cents per 1,000 cubic feet for gas and is much better off in this respect than most American cities. It is reported that the gas company was glad to renew its contract even at such a low rate. It is up to the mayor and aldermen of other cities to obtain a similar reduction in their gas rate.

THE civic authorities of San Francisco recently passed the following resolution: "Resolved, That the Board of Pub-

lic Works be requested and directed to make provision, hereafter, prior to the paving or repairing of any street for permanent conduits thereunder, for the accommodation of any pipes or wires that may be placed under the surface of said streets." Every American city should pass a similar resolution and should forestall, as far as possible, the tearing up of new pavements by providing for all such contingencies prior to the laying of new pavements.

We urgently request that heads of departments send us their reports as soon as available that we may review the same and place them on file for reference. Please place us on your mailing list at once so that we will not be forgotten when the reports are ready.

We begin in this issue a series of articles on Portland cement, prepared by our engineering editor, Emil Kuichling, who has had a wide and varied experience in the use of this popular building material. Mr. Kuichling will treat the subject in a most thorough manner, but not from the ultra-technical standpoint. The information will be given in such a form as to be readily apprehended by all classes of city officials, not simply the engineer. The purpose is to make the description of the origin, development and uses of this wonderful material so practical that it will be of more than passing value to not only the technical, but the lay members of city governments. It is hoped, also, that the articles will be provocative of many inquiries along this line. Any suggestions from our readers as to what would be of especial interest to them will be gratefully received and given careful consideration.

The city of Harrisburg, Pa., is making a commendable effort to get rid of its unsightly wooden telegraph, telephone and trolley poles, of which there are a total of 5,214 within the city limits, according to *The Patriot*. There is only one thing to do in such a case and that is to cut the poles down and put the wires underground, where they belong. It is up to the Board of Aldermen to see that proper legislation for such a procedure is passed.

More Comprehensive Water Statistics Needed

Madison, Wis., Jan. 15, 1904.

Editor, Municipal Journal and Engineer:

Pages 23 to 26 inclusive of our last report will probably give another phase to the situation of our city, than under your water works statistics, page 22 of the January issue. To my idea there ought to be a column stating the per capita amount of water in gallons that passed through the meters and was paid for, and such that was paid for under the schedule rate. In our case it was twenty-one gallons per capita.

With all care, you cannot prevent the wastage of water in schools, fountains (drinking and jet), flushing of sewers, sprinking of streets, etc., notwithstanding the fact that meters are attached, where there is no rent collected, as in our case.

The municipality owns and controls the water works, school and public buildings and will not tax itself for the water any more than to charge tuition in the public schools. If a school building is, or becomes too small, another building is erected and the tax-payer foots the bill. So with the water, the city does not want to be stinted, and the tax-payer has to pay for the waste. We do a great deal of flushing of mains and are bound to give our patrons good water, paying no attention as to the amount it takes. This the consumer pays for in his water rent. If a leak takes place, either large or small, the water cannot be accounted for.

If we were paid for all the water we pump, we naturally would make our rate accordingly, but, as we sell less than one-third of the water we pump, our rates are fixed to cover the operating expenses and a profit. The city pays us, out of the taxes, $10,000 for its use. This payment of $10,000 by the city was done for the first time this year and we expect it hereafter annually. On account of this payment by the city we have reduced our rates and placed the minimum at $4.00 per annum.

This wastage of water and estimated free water has always been a conundrum to solve. I think our way is the solution. The city ought to pay its share and relieve the water taker from the burden.

John B. Heim, *Sup't Water Works.*

I fully agree with your opinion that the statistics should embrace a column giving the per capita consumption of water passing through meters; but I would go a little further, and have three such columns, giving the metered consumption for domestic, commercial and manufacturing uses separately, and a fourth column for the amount used for general public purposes.

My point is, that our estimates for the quantity of water required per capita in a city rests upon insufficient or inadequate data, for all the various uses except purely domestic use.

I have in mind the case of a small community of 2,000 inhabitants, contemplating the construction of a water works system, with an allowance of only 100,000 gallons per day, or 50 gallons per capita, and at the same time intending to supply the locomotives of a large railroad corporation.

On investigating the probable needs of this railroad, it was found that at least 150,000 gallons per day would be required for its proper service, and that at least 50,000 gallons per day, and more, would be needed for a few factories. The total estimated daily consumption was thus 300,000 gallons, or 150 gallons per capita without any margin for future growth.

The statement of a total initial consumption of 150 gallons per capita appears excessive in comparison with the actual consumption in many cities, but the quantity is fully warranted by local conditions.

If we had the daily consumption by the various classes of users properly tabulated, estimates of quantity required for new works could be made much more easily and safely, inasmuch as we might then draw upon the experience of many other places, in these particular directions.

We would also avoid the necessity of explanations in the case of cities like those cited in my article, where most of the service taps are metered, and only about one-half of the water is accounted for.

E. Kuichling, *Engineering Editor.*

Personalities

—Mr. John K. Hays was elected City Controller of Williamsport, Pa., to succeed the late Heron Hinckley.

—The Lawrence, Mass., Council selected for City Solicitor, John P. Kane, and for Clerk of the Council, Richard J. Shea.

—City Clerk Dadman, City Treasurer A. G. Stiles, and City Auditor David Chase were re-elected by the City Council of Lowell, Mass.

—Mayor Mark M. Fagan of Jersey City, N. J., has reappointed City Comptroller George R. Hough and City Treasurer William F. Ely.

—The City Council of Haverhill, Mass., re-elected City Auditor Rowe, City Treasurer Glines, Superintendent of Streets Westcott, and City Solicitor Essex S. Abbott.

—The Superior Court of Maryland recently handed down a decision confirming the election of Mayor Robert M. McLane which had been disputed by one of the other candidates for the office.

—The Councils of Newport, R. I., re-elected these officers for the coming term: Street Commissioner, William Hamilton; City Engineer, William H. Lawton; City Solicitor, J. Stacy Brown.

—Mayor Warren of Westbrook, R. I., appointed the following city officials: Treasurer, Charles M. Waterhouse; Street Commissioner, Francis H. Grant; City Solicitor, Frank H. Swan.

—The Common Council of Elmira, N. Y., made the following appointments of city officers: City Chamberlain, Seymour Lowman; City Clerk, Isaac H. Levy; City Attorney, Richard H. Thurston.

—City Clerk Charles S. Susdorf was re-elected by the Buffalo, N. Y., Council. Hon. Henry C. Ladd will be President of the Common Council, and Hon. John O. Manning, President of Board of Aldermen.

—The Council of Worcester, Mass., selected these officials at the first meeting this year: City Solicitor, Arthur P. Rugg; Street Commissioner, Walter E. Hassam; City Treasurer, Fred W. White; City Engineer, Frederick A. McClure.

—Mayor Joseph T. McTeer of Knoxville, Tenn., was renominated by his party while in New York City in a private hospital where he had undergone several operations. He was unable to be brought home and later died in New York from kidney trouble.

—The new City Clerk of Trenton, N. J., will be former Assistant City Clerk Harry B. Salter. The City Comptroller will be Edward S. Parkinson; the City Solicitor, Charles E Bird; the City Engineer, Charles C. Haven, and the City Treasurer, W. J. B. Stokes.

—Mayor J. C. Haynes of Minneapolis, Minn., recently sent a message to the Council recommending the immediate appointment of a committee to investigate the conditions of the theatres, stating also that he would compel certain changes under penalty of revoking the licenses.

—In his annual message Mayor Knight of Buffalo, N. Y., calls attention to the need of preserving the shade trees on which much of Buffalo's fame has rested. Insects and horses are rapidly causing their death. He urged that a non-salaried forestry commission should be appointed to look after them.

—Mayor Rose of Milwaukee, Wis., has urged the Council to accept the proposition of Mrs. Ella Kneeland Gregory to transfer the Kneeland homestead and grounds to the city for a park to be known as "James Kneeland Park," in return for an annuity of $10,000. The cost to the city under these terms could not be over $200,000.

—The City Council of Taunton, Mass., elected the following officers at its first session this year: City Treasurer, Edward H. Temple; Superintendent of Streets, John H. Church; Superintendent of Public Buildings, Herbert N. Pierce; City Solicitor, John B. Tracy; City Engineer, Alonzo K. Crowell; City Auditor, Edward A. Searle.

—In his message Mayor Lynch, Lawrence, Mass., said that the disposal of garbage and refuse must be soon seriously considered. Streets leading into the city should be well and smoothly paved. All paving should be done under a systematic plan and more permanent pavements should be laid. The sewerage should be extended, as it is of prime importance.

—Mayor Body of Spokane, Wash., has a poor opinion of the city charter. He contends that the Mayor should have the power of appointment with consent of Council, but should be able to remove officials without anyone's consent. At present, he says, a number of incompetents are in office and he cannot get them out because of political reasons which influence a majority of Council.

—President Martin W. Littleton, of the Borough of Brooklyn, N. Y., is in favor of the establishment of a Bureau of Public Safety in each of the five boroughs to have jurisdiction over the construction and management of all places of assembly and to handle all sudden perils that might menace the health of the citizens. The heads of the Police and Fire Departments, the Sanitary Superintendent, and the Superintendent of Buildings, together with the Borough President should compose the board. All departments could then work together instead of at cross purposes.

—Comptroller John B. Larkin, of Pittsburg, Pa., issued a statement recently attacking the city government. He characterized the city representatives, who presented to the Council Finance Committee estimates of expenses, as "the cunning promoters, daredevil plungers, and slick, oily-tongued fakirs," who "see a carnival ahead. They have the side shows ready to unload the moment the new tax levy is in sight. * * * That this lawless raid on your treasury should be permitted is a disgrace to able-bodied citizens of this city. It is an insult to an intelligent, unbridled press, and a brutal menace to your government." He gives the figures asked by each department and, in conclusion, said in part: "I reason out, and think the people will agree with me, that there should be a season of rest from these exactions and drains on the economies and savings of the homes and a heroic effort made to reduce the cost of annual necessities."

Convention Dates

February

Nebraska State Conference of Charities and Correction will be held at Lincoln, Neb., February 2-3, 1904. John Davis, State House, Lincoln.

National Brickmakers' Association will hold its convention at Indianapolis, Ind., February 3-6.

Civil Engineers' State Convention is to be held at Hartford, Conn., February 9. J. Frederick Judson, Box 1304, New Haven, Conn.

State Supervisors, County Commissioners and County Clerks' Association will meet at Cairo, Ill., February 8. Jesse E. Miller, Cairo, Ill.

The American Road Makers' Association will meet at Hartford, Conn., February 10-11. William S. Crandall, secretary, 253 Broadway, New York City.

The League of Michigan Municipalities will hold its annual convention at Ann Arbor, Mich., February 11-12. Mayor John F. Bible, Ionia, Mich.

New Jersey State Conference of Charities and Correction will be held at Atlantic City, N. J., February 18-20. Mrs. E. E. Williamson, 310 N. Broad street, Elizabeth, N. J.

Charities and Corrections State Conference of Virginia, will be held at Norfolk, Va., in February. George B. Davis, Richmond, Va.

April

The National Municipal League will hold its annual convention at Chicago, Ill., in April. Clinton Rogers Woodruff, 121 So. Broad street, Philadelphia.

August

The League of Georgia Municipalities will convene at Savannah, Ga., August 10, 1904. Mayor Bailey, secretary, Griffin, Ga.

Millions Wasted on Filtration

According to Professor Geddes, of Glasgow, the combination of chemical and electrical science has resulted in a discovery that will make virtually superfluous the prodigiously costly filtration plants in this and other cities. He remarks that, in the pursuit of pure water, there are two modes of sanitation. At first we try to purify the river, but later it begins to dawn upon the authorities and public that it would be simpler, and even cheaper, to stop polluting it.

The agriculturist, the chemist, the bacteriologist, have each come into the problem, but the latest arrival is the electrician, who revolutionizes our ideas and works for us what may well seem miracles. The Seine River authorities recently issued a truly startling edict, and have begun permanently to supply several of the suburban towns outside the fortifications of Paris, notably Genevilliers and others, with the long and justly dreaded Seine water, but now and henceforth in a condition purer than that of the best spring-water itself.

For the electrician has suddenly transmuted for them one of the worst water-supplies in the world into the very best. This immensely valuable contribution to practical science is founded upon a simple discovery—namely, that of utilizing the discharge from an electrical machine. M. Otto rotates a cylinder studded with points within another with smooth surfaces, between which circulates the air to be ozonized. A simple and costless device, familiar in every laboratory, intimately mixes the impure water as it runs from the reservoir with this ozonized air; the rapid oxidation of its organic matter is indicated by a phosphorescence visible in darkness till the process of its destruction, or rather combustion, is complete, and thus the water runs off purified, aerated, regenerated—safer to drink than the best of springs!—*City and State.*

Sheffield's Success with Refuse Destructor

How to deal properly with the refuse of a large city is a problem that has yet to be solved in many municipalities of the country. American cities can learn much in this direction from those of England, where refuse destruction is being dealt with so successfully. Sheffield has been operating a refuse destructor for a dozen years, where, in each of fifteen cells, an average of eight tons of refuse is burned every day. The cost of doing the work amounts to about 25 cents a ton. The cremation of the refuse is not the ultimate end of the dectructor, for the clinker or residue produced is useful. The Committee on Health of the city installed flag-making and mortar plants in connection with the destructor and, during 1903, 11,270 concrete flags were turned out and sold to the city's highway committee. About 1,388 tons of mortar were also disposed of. This destructor was only large enough to serve not quite two full sections of the city and took care of all kinds of trade, house and street refuse, including the destruction of cats, dogs, pigs and fish. The success of the first has induced the city authorities to install a second plant, which will be capable of cremating 120 tons a day in twelve cells. The same character of refuse as is dealt with in the other plant will be taken care of, the contents of middens, of which there is still quite a large number in the city, being disposed of in other ways. The City Surveyor planned the new plant and the Superintendent of the Cleansing Department, Mr. James Jackson, said that steam, not air, would be used to obtain a force blast and a higher temperature will be maintained than in the old destructor. A dust catcher will also be placed between the boiler and the chimney to effectually arrest all dust. This catcher consists of an inner and an outer well. This dust enters the outer well, swirls around and throws the dust against the sides. The gases then enter the inner chamber from the top and pass downward and through an opening at the bottom into the chimney. At intervals the dust is removed from the bottom of the two wells.

Debts of German Cities

The Statistical Year-Book for German cities places the debts of the various municipalities at the following figures: Berlin, $74,494,000; Munich, $35,105,000; Frankfort, $25,466,000; Leipzig, $19,658,000; Cologne, $17,468,000; Hanover, $16,374,000; Dresden, $15,113,000; Breslau, $13,566,000. Elberfeld, Magdeburg, Nuremburg, Dusseldorf, Charlottenburg, Mannheim and Stettin have debts running from $9,520,000 to $11,900,000 each. The total debt of the fifty-two German cities is more than $443,870,000, excluding newly made loans which amount to $51,408,000 and a loan soon to be made by Berlin that will amount to $54,264,000. Berlin yearly devotes $3,867,500 for interest and sinking fund; Cologne, $2,570,400; Munich, $1,999,200; and Frankfort, $1,761,200.

FROM THE MAYORS' VIEWPOINT

What Their Cities Need in Improvements to Paving, Sewerage and Sewage Disposal, Water Supply, Paving Machinery, Etc.

Wants Board of Public Works

All macadamizing of streets in Woonsocket, R. I., should be done by city employees recommended Mayor Alphonse Gaulin, Jr. He also recommended that either a commissioner of public works or a board of three men should be appointed to take charge of the different departments engaged in construction work. If a commissioner be elected, he recommends that the City Engineer or equally competent person be chosen. Main streets should be paved, sidewalks should be put in good condition and street trees should be taken care of. Street watering should be assessed on the benefited property.

Should Make Permanent Street Repairs

Mayor Roswell L. Wood, of Haverhill, Mass., recommended that repairs to streets should be of a permanent character so that it would not be necessary to go over them again. He urged that the position of Superintendent of Street Sprinkling be abolished, and the Superintendent of Streets take charge of the work. The Chief of the Fire Department should take over the duties of the City Electrician whose office should also be abolished.

Should Consider Different Paving Materials

More storm sewers are needed in Providence, R. I., according to Mayor Augustus S. Miller. About ten miles of streets should be paved with more durable and, therefore, more economical material. Careful consideration should be given to different kinds of paving materials. He said, "The Commissioner suggests that there are several classes of pavement that are suitable for streets where macadam is objectionable; that when the grade is flat and the sunlight can reach the pavement, asphalt still retains its popularity; that where the grade is steep, bitulithic macadam is giving good satisfaction, since it furnishes an excellent foothold for horses, and can be watered without injury to it, and that vitrified bricks also furnish a durable and approved pavement." An annual appropriation should be made to replace a certain section of macadam each year with permanent material. A new pumping engine is needed in the waterworks station. The State control of the city's police should not be allowed to continue.

Improvements in Pawtucket

A number of extraordinary improvements cannot be much longer delayed according to Mayor James H. Higgins of Pawtucket, R. I., and among them he mentioned the widening of Main street, two new bridges, purchase of a gravel pit, a new fire station, extension of sewer system, opening of new streets. At least $275,000 must be expended.

Permanent Pavement Improvements Recommended

Taunton, Mass., purchased a stone crusher and Mayor Richard E. Warner recommended that the best use be made of it and that some system of permanent improvements to the pavements be made. Regarding franchise grants, they should not be made hastily or immaturely. The grade crossing commission was called to account for its supineness. Public welfare demands the abolition of the crossings. The charter should be revised by a special commission, as experience shows it to be defective in many particulars.

Should Be Economical

"A yearly expenditure, once adopted, is almost impossible to reduce or cut off," said Mayor Joseph A. Warren, of Westbrook, R. I., and so departments should keep expenses well within the city's income. A new school house should be erected, a bridge built and a park system instituted. Sidewalks should not be neglected as they have been.

Sewage Disposal Plant to Be Increased

Meters should be placed on all the fire pipes entering private property at the expense of the owners, that no water might be wasted, recommended Mayor Walter H. Blodgett, of Worcester, Mass. New filter beds must be added each year to the sewage disposal plant, but expenditures should be made as light as possible. A playground should be laid out at Quinsigamond. A board of public works should be instituted as much more satisfactory work could be done if the departments were under the control of such a board.

Portable Stone-Crusher Recommended

Mayor John P. Elton, of Waterbury, Conn., considers that it is poor policy to spend much money on repairs when sufficiently large appropriations would make repairs unnecessary to a large extent. He recommends that a portable stone-crushing plant be purchased and other equipment of their character belonging to the city should be gotten into good shape for work. While the water supply is excellent, there are three weak spots in the system, viz.: The need of high water service; the need of replacing small with larger pipes in certain districts; and the more thorough inspection in regulating the use of water. The great waste of water should be brought home to the ones who are responsible. "Placing a water meter where waste occurs will bring immediate good results."

Highway Department Severely Condemned

Mayor Tolman, of Gloucester, Mass., said that the city now owned a road roller, stone crusher and other road paraphernalia, and the Highway Department could now do the work impossible a year ago. He condemned this department as being in very bad shape, for no judgment was used in expending the people's money. He claimed that the Water Department was far ahead of the Highway, although the former was "a foot-ball for would-be agitators and politicians." The Mayor claims that he has been continually deceived as to the true condition of affairs in this department. The plan of placing the control of the street lights, which are furnished by a private company, under the Marshal, has proved a good one. He uses his judgment as to when they should be turned on. The city pays $82 for arcs, $14.75 for incandescents, and $16.80 for gas lamps per year.

Better Water Supply Needed

Extensions should be made to the sewer system in Springfield, Mass., according to Mayor Everett E. Stone, and the trees should be protected against destruction from insects. About five miles of wires were removed from the streets to underground conduits and this work should go steadily on. The Fire Department should be increased in the line of permanent men, while the call men should be reduced. A better and more palatable water supply is needed and a commission is now considering the question. As much permanent paving as possible should be placed on main thoroughfares and, in the selection of materials, care should be taken that they possess the requisites essential to the location of the street.

Municipal Paving Plants Should Be Considered

So much advance has been made in the art of building smooth street pavements that Mayor Charles E. Howe, of Lowell, Mass., thinks that the question should be carefully reviewed that the city may secure the best pavement. He is sensible of the fact that the best is not the cheapest in first cost. He has been impressed with the growing idea of municipal paving plants whereby cities do most of their own paving, as he made considerable inquiry into the subject. He recommends that the plan be considered by the City Engineer, the Street Commissioner, and the Street Committee. All granite block paving should be laid on a substantial foundation and all streets so paved which run from the center to the outskirts of the city, should be repaved and the abuttors not be allowed to open them for five years.

Large Intercepting Sewer Needed

Arrangements should be made to construct a large intercepting sewer which would take all the sewage of Utica, N. Y., that now empties into the Mohawk River, and carry it beyond the city, for, argued Mayor Charles A. Talcott, the time may soon arrive when no sewage may be allowed to enter the Mohawk west of the city. The cost of the sewer would be over $150,000. The sewage, other than the storm water, would then have to be disposed of in a plant for the purpose, so that the river would be kept clean. Measures should be taken to macadamize streets in the outskirts of the city and the repairing of streets should be carefully attended to.

Paved Streets Important to City's Welfare

Mayor T. G. Nock, of Rome, N. Y., recommended that a set of books should be kept showing the financial condition of the city from day to day, for the use of officials and citizens. Well paved streets are most important to a city's welfare, but care should be taken in letting contracts to guard the city's interests. While he considers that flushing pavements is the best way to clean them, it is out of the question in Rome and the next best thing is to sprinkle and clean by hand or machinery, carting the dirt away at once. He also recommends that a fire engine house be placed in East Rome.

Asphalt Streets in Bad Condition

More money is needed to keep the streets of Newark, N. J., clean and Mayor Doremus recommended that larger appropriations should be made. A dozen men could be employed well in keeping crosswalks clean and sidewalks should be kept in repair. An ordinance should be passed fixing a certain rental per cubic yard for all vaults built beneath the walks. This should be done before too many vaults are built, for it would then be difficult to pass such a measure. The Legislature should be asked to pass a bill permitting the expenditure of a sum not to exceed $5,000, for annual city excursions for the children, trials of these trips during the past year having shown their value. He called attention to the unnecessary noises that citizens must endure, such as the blowing of factory whistles and the ringing of bells. He urged that departments should be more prompt in issuing their reports. An improvement should also be made in the compilation, classification and arrangement of these reports. The asphalt streets are in very poor condition, according to the Mayor, and he called attention to the fact that trials had been made during the year, in the paving of one street with creoresinate wood block and that a stretch of bitulithic pavement had been laid. He recommended that provision should be made for complete and thorough tests of all paving materials and that paving inspectors should be carefully selected.

Police Alarm System Needed

Three points of interest were brought out in the message of Mayor David Greenlie, of Passaic, N. J. These were, the need of street signs to take the place of those that had been destroyed and to mark newly opened streets; the institution of a merit system to compensate the police officers for faithful service, and the installation of a modern police alarm telegraph system.

Steam Road-roller Needed

The financial condition of Williamsport, Pa., was cause for special gratification according to Mayor John F. Leadlein, the net indebtedness being $599,504.91. It is a mistake to limit selection of paving materials to one kind, and to start paving operation so late in the season that cold weather finds them unfinished. A number of streets should be paved and a steam road-roller should be purchased for use on the unpaved streets. The new ordinance regulating the laying and maintenance of walks should be thoroughly carried out that fewer damage suits against the city shall result. He recommends that the Council should be well represented at the meetings of the league of third class cities of the State, and that the salaries of the Mayor and Comptroller should be raised.

Should Credit Water Department for Free Water

Mayor Cornelius F. Lynch, of Lawrence, Mass., reported a poor financial condition of the city, due to overdrafts. "A system of overdrafts is pernicious. Departments should keep within sufficient appropriations for economical management of their affairs." The Water Board is right in claiming that the expense of furnishing water is not distributed equitably, and the Water Department should be credited with water used by other departments; 34 per cent. of all water pumped in 1901 being used for sprinkling, fire and municipal purposes, and this amount was 6 per cent. more than that used by metered consumers, who paid $60,000 to the Department. Therefore, the Department should be credited for the free water supplied and it could then materially reduce the water debt. A greater economy should be practiced in use of water, the use of meters showing that there are large quantities wasted, as they always cause a reduction in consumption.

Recommends Municipal Lighting Plant for Buffalo

ONE of the most important portions of the annual message of Mayor Erastus C. Knight, to the Council of Buffalo, N. Y., was in relation to the lighting problem. For two years a controversy over the gas contract has taken place, the Buffalo Gas Company being compelled but recently to reduce the price of gas to consumers according to the law, and this controversy, said Mayor Knight, should awaken the citizens and the Council to a serious consideration of the question of a municipal lighting plant. Two years ago a five-year contract was made with the Buffalo General Electric Company for street lights, the price being reduced from $100 to $75 a lamp per year, but the question of a municipal plant should be considered at once. In 1866 the first agitation of this question was commenced, but the time is now at hand when, if the citizens desire such a plant, the opportunity should be seized, otherwise, in the spring of 1907, there will be nothing to do but award further contracts for lighting at whatever prices the companies may demand. The opportunity referred to is the provision in the franchise of the Niagara Falls Power Company, accepted in 1896, which requires that all the poles and conduits of the Company must be sufficiently large to accommodate the wires of another company doing as large a business as that of the first company, and the extra space must not be used by the said first company for a period of ten years, during which time the city may use the space for a public purpose, from which no revenue is derived, free of charge and for the period of the franchise. Hence, but two years remain in which to install a municipal plant. If advantage is taken of this period of two years, for twenty-six years, the period remaining of the franchise, the city would have free poles and conduits for its wires, otherwise a large expenditure must be made for this distributing system.

Exclusive Franchises Obnoxious

IN regard to the granting of franchises to gas, electric light and telephone companies in Pawtucket, R. I., Mayor James H. Higgins had something to say in his annual message. He is opposed to these franchises which provide for exclusive privileges for from fifteen to twenty years, and feels that all such natural monopolies should be owned by the people. In the first place, he thinks that exclusive franchises are highly obnoxious. "The city should not burn all all of its bridges behind it, and take away all chances of improvement by making exclusive grants." The city should always have the opportunity of building its own plant or of allowing other companies to compete. "Secondly, the contracts are for too long a term. Many circumstances might arise within a period of twenty years which would cause us to regret our action in granting a franchise for so long a time. The cost of production may be cut in half by new inventions. All such cheapening should accrue to the benefit of the public. We have here in Pawtucket seen the folly of granting long term franchises in the case of the street railroads which have had us so completely at their mercy. Let us profit by that mistake. For the present let us grant no franchises for any term in excess of five years. We have no moral right to tie the hands of our successors for any longer period."

In the third place, he considers the prices of the companies too high, as $1.50 is paid for gas, while Providence pays but $1.05. The quality of the gas is also very poor. The price of electricity, $1.08, is much too high and other cities, similarly situated, do not pay such prices.

"Fourthly, the percentage to be paid to the city is, in every instance, too small. The contracts are sought under the provisions of Chapter 77, of the general laws. This chapter is of a particularly mischievous and iniquitous nature. Under its provisions not more than 3 per cent. of the gross earnings can be charged, and then only when the contract is exclusive. There is reason to believe that it may in a short time be removed from the statute books. In Providence the Narragansett Electric Lighting Company pays 5 per cent. of its gross earnings to the city. In some cities as high as 10 per cent. of the gross earnings has been paid by public service corporations.

"Another most important objection to these franchises is the failure to protect properly the private consumer. It would be of little benefit to the city as a whole if the company paid us 5 per cent. of even 10 per cent. of its gross earnings, and then made up for it by overcharging the public or by lowering the quality of the product. As the city itself is a small consumer, compared with the great body of private users, the latter are entitled to the greater consideration. Any contract that is agreed to by the city should have ample provisions as to quality and price to the consumer. Tests and inspections by capable and disinterested parties should be regularly made. The limit of price should be fixed, and the same should be lowered at any and all such times as a lessening in the cost of production would warrant."

Boston Water Supply Doubled

BY the opening of the Sudbury dam, which has but recently been finished, the Metropolitan Water and Sewerage Commission of Boston completed one of the most important steps and the water supply for the metropolitan district has been increased to almost double its previous capacity. The Weston aqueduct into which will be turned the supply from the Sudbury dam, has a capacity of 300,000,000 gallons a day and from this aqueduct the water will be distributed by pipe lines under the Charles River to a point where it connects with the old pipe lines in Boston. There is a fall of thirty-five feet between the high water in the dam to the top of the aqueduct. Thence the masonry conduit extends through Southboro, Framington, Wayland and Weston, being interrupted twice where the line crosses valleys, by steel pipe lines, and again by the Weston reservoir and open channel. For the first three and a half miles the masonry aqueduct has a fall of four feet in 5,000, is ten feet wide and nine feet three inches high, the section being horseshoe shaped. Thence to the Weston reservoir a fall of only one foot in 5,000 could be obtained, and here the aqueduct is thirteen feet two inches wide and twelve feet two inches high. The aqueduct is built almost wholly of cement concrete, but has a lining of one course of brick on the bottom and sides. Five hills are penetrated by the aqueduct by tunnels varying in length from 600 feet to more than a mile. At the valley of the Sudbury river, where the ground falls

about seventy-five feet below the grade of the aqueduct, and at Happy Hollow, fifty feet below the grade, a seven and a half foot riveted steep pipe has been substituted for the masonry aqueduct.

An equalizing reservoir, called the Weston reservoir, has been constructed in Weston, about a mile above the terminus of the masonry aqueduct, the necessity for which arises from the fact that the pipes of the distributing system will convey more water in the daytime than at night, when less water is used. The total length of the reservoir and open channel is 5,366 feet; the area of water surface is about sixty acres. A system of drainage has been constructed which will divert all local water from the reservoir. Where the masonry aqueduct discharges into the open channel a channel chamber has been built, in which stop-planks can be placed to retain the water when it is desired to empty the aqueduct. At the lower end of the reservoir is the screen chamber, where screens will be maintained for removing leaves and other similar matter from the water. From the terminal chamber, a short distance west of the Charles river, the pipe lines, which are to convey the water to various portions of the district, will start. The line now connected with the old pipe lines supplying the city of Boston, east of Chestnut Hill reservoir, are seven and four-tenths miles long, and for a large part of this distance is laid through the Newton boulevard.

American Water-Filtration Plants in Russia

The American system of water filtration has been adopted in many of the cities of Russia. Owing to the turbidity of the large rivers in Russia, they are very objectionable as sources of supply for municipalities or for such manufacturing purposes as paper making, bleaching, dyeing, the making of chemicals, etc., unless the sedimentary matter carried in suspension is first removed. In 1898, the chief engineer of the Moscow waterworks was sent to the United States to investigate and report on the American system of rapid filtration. On his return to Russia experiments were undertaken which demonstrated that by the American system extremely turbid waters could be rendered bright and clear at a rate of filtration fifty times as fast, and with only about one-thirtieth of the space required under the old sand system, while from a sanitary standpoint the bacteria were reduced over 99 per cent. The lessons taught by these experiments at Moscow resulted in the installation of the American systems at Moscow, Nizhni Novgorod, Tzaritzin, Ribinsk, Balashoff, Amarvir, Vladimir, Simbirsk, and Tomolsk. In addition to these, American filters have been used for manufacturing purposes on a large scale at Kostroma, Yaroslav, Orehoro-Zoupere, Tver, and Moscow, and others of this description are now in use by the Russian Government at its navy department in St. Petersburg. Formerly, all of the parts of these filters were made in the United States—the cypress-wood tanks in Boston and the machinery, valves, and brasswork in New York. Since the late advance in the duties on American ironwork, several of the heavier parts of the machinery are now being made in Russia by the Jewell Export Filter Company.—*U. S. Consular Report, No. 1,845.*

Important Work of Municipal Electrical Departments

The necessity of regulating the placing of wires on the streets of cities is being realized by many cities and efforts are being made to supervise the numerous telegraph, telephone and other companies using the streets for their service wires. When the importance of city supervision is thoroughly understood, other cities will follow in the footsteps of Washington and other cities that already are exercising their power to rid the streets of poles and wires that are not only unsightly, but are a positive menace to the work of the fire department. The work of the Electrical Department of Washington is not confined to bettering the street conditions alone, but extends to all electrical wiring and the improvement of public lighting. The report of the Electrical Engineer, Mr. Walter C. Allen, will be of interest as showing just what the Department has been doing and how far it has accomplished what it has set out to do.

The special features of the good work of the Department was the improvement in public lighting and the large increase in the number of telephone wires taken off of the streets and placed under ground. The system of arc lighting has been changed from the open to the enclosed arc style. The number of lamps in operation was 584 inclosed-series and 381 inclosed-multiple lamps. The number of gas lamps in use at the time of the report was 7,070: 1,373 naphtha lamps, 771 incandescent and 965 arcs. A number of incandescent gas mantle lamps was discontinued during the year, no new contract being made for them, as bids for the same did not come within the limiting rate of $25 per lamp per year. The greater part of the gas lamps added was changed from these mantle gas lamps. The rate of $25 was fixed by Congress at the time that the District was paying $30 per lamp and so the District Commissioners could not award any contract. The naphtha lamps maintained were of the flat-flame kind and did not give the satisfaction secured from even the flat-flame gas burners.

The department possesses supervisory authority over all companies doing electric lighting, furnishing electric power, or telephone and telegraph service within the District. All these companies must secure approval to their applications before doing any work in the streets. It also makes certain provisions relative to the character of the electrical installations and carries out the laws of Congress or the District Commissioners regarding such companies. At present the Department has the authority of inspecting electric wiring in hotels, theatres, and other public buildings, but authority is to be asked from Congress to permit the Department to inspect electric wiring of all kinds within the District. The police and fire alarm telegraph is also under the charge of the Electrical Department, as well as the telephone system used between the public offices. All electrical work undertaken by the Commissioners in the schools, engine houses, police stations, etc., is supervised by this Department, which acts as electrical expert for the designing of all apparatus.

Another important branch of the Department's work is in the supervision of the wires of the public corporations and the conduits laid by them. Congress compelled the different companies to furnish the District with such space in conduits as was required for District wires and cables.

Only a small amount of electric lighting conduits owned by the power company is used for the District wires, but over 52,600 feet of telephone cable of the District lie in the conduits of the telephone company. In District conduits are 9,548 feet of District cable. The greater portion of the overhead wires of the District are upon poles of the different companies, but the District owns a few poles of its own. Under certain regulations, the companies may attach wires to the District's poles.

During the year the telephone company removed 633 miles of wire and put up over 730 miles, but with few exceptions, these were placed on poles in alleys. All the conduits and poles of the private companies are taxed as real estate, the value being placed by the Board of Assessors at two-thirds of the market value and the rate of taxation being $1.50 per hundred.

Considering the insufficient legislation, the work done by the Department has been of the greatest importance and when full powers are granted it, it will be able to demonstrate still further the important part it plays in the affairs of the city.

City Urged to Do Its Street Sweeping

THE Merchants' Association of San Francisco, Cal., has recommended to the Board of Public Works that the city undertake its own street sweeping, provided the work be done under civil service rules. Its own experience of sweeping the streets, when it undertook to show that the streets could be kept clean, proved that failure would result if such rules were not adopted. In a letter to the Board, it criticised the way in which the streets are now cleaned by contract, the city not receiving the service for which it pays. The letter outlined the method by which the work should be done and predicted failure if certain conditions were not complied with.

The entire dapartment must be under civil service; only the necessary number of men must be hired; incompetent or physically unfit men must not be employed and all must be made to work faithfully. The superintendent should be experienced and should have full power, being held responsible for the results and not being interfered with if results are satisfactory. A separate department of street cleaning should be formed to consist of superintendent, assistant superintendent, bookkeeper, stenographer, and a limited number of inspectors to serve as outside foremen. Foremen of hand labor gangs should work as sweepers. For two years the city should hire its teams, sprinklers and sweeping machines, as the efficiency of the department should first be proved before a large amount of money is spent. The sum of $215,000, the present appropriation for the work, would be sufficient to run the department for the coming year. Unless civil service rules are applied in hiring employees, the Association is emphatically opposed to the city's undertaking its street cleaning. Examinations for sweepers should be to determine their physical ability to work, together with proof of residence, citizenship and experience, additional weights being given for each year's experience. Foremen sweepers should be able to read, write and cipher to the extent of making out intelligent reports and keeping time. Experienced men should also receive extra credits.

Motor Wagons for Municipal Work

THE question of economy in municipal work is ever before the city official and one item in the yearly expense account is that of haulage. Therefore, the question of using motor vehicles in place of horses is one to receive serious attention with a view to learning in what way, if any, expenses may be reduced. The question was recently discussed in a paper read by Joseph E. Parr, Assistant Surveyor of the Handsworth Urban District Council, England, before the Midland Municipal Officers' Association, a digest of which follows:

Many leading municipal engineers are experimenting with the machines and their reports provide fresh statistics relating to the cost of actual working. The machines are being tried not only for the fire department, but also for street watering, refuse collecting, etc. While the number in use is limited, yet they are doing the work so well that an increase in number may be anticipated.

The steam machines are usually made with interchangeable bodies, so that the same machine may be used as a watering cart, street flushing machine, or ordinary dump wagon. When the engine is carrying a water tank for street washing, a revolving squeegee may be fitted and operated by the mechanism of the wagon, and with a distributor plate to direct the water in a steady stream in front of the squeegee. A brush may be substituted for the squeegee. About seven cubic yards of material may be carried and suitable appliances enable the entire load to be tipped from the rear by one man.

Regarding the comparative cost of motor and horse-drawn wagons, the author speaks from his own experience with a tipping wagon and trailer which were used to cart refuse from an outlying district to the destructor works, a district of three miles. Only three trips a day are made by the horse-drawn carts and the cost of a single team per day is about $2.25 and 1.1 tons of refuse are carried on each trip. The cost is 3.6 cents per ton-mile spread over a term of ten years and including maintenance, depreciation and capital expenditure. The motor wagon and trailer have a capacity of more than five times that of the horse wagon and travel at twice the speed. Careful consideration of the workings of the steam machine shows the cost to be from 6 to 7 cents per ton-mile, providing that it can be filled and not be delayed on its journey or in getting away from either end of the line. If delay is experienced, the cost will run up appreciably. In one trip the steam wagon carries almost as much as the horse cart does in two days.

According to the author the best way to get the full value of a motor wagon is to establish a central collecting station to which the collecting carts could bring their loads and, from a platform, dump them directly into the motor wagon without handling, the latter being kept traveling between the station and destructor works or dumping grounds. In this way about thirty-six tons of refuse could be carried away in a working day of ten and one-half hours. The collecting carts could then make five trips a day at a cost of 4 cents per ton-mile, exclusive of the cost of station buildings and site. In the district in question the usual weekly collections were about 110 tons. As the motor wagons must be loaded with all possible speed, at least six men must be assigned to each wagon. They can load the wagon and trailer—six tons—in two and one-half hours. Allowing one and one-quarter hours for the trip and a quarter hour unloading, seventy-two tons could be collected and carried by one wagon. Two trips could be made a day, steam kept up for nine hours and the cost would amount to $117.75 for hauling a week's collections. If the refuse from this district is taken to the station by horse-drawn carts and the motor cart hauls it to the destructor, the cost would be $439.25 for the week, but the motor wagon under this arrangement could carry 216 tons as against 72 tons under the other arrangement.

In Hampstead two motors were used for two years, mainly for collecting refuse. Horses and carts cost $9.66 per day and the motor, including wages, repairs and depreciation, $7. The only drawback was the necessity of frequent stoppages for small repairs. At Kensington, according to Borough Surveyor William Weaver, a motor wagon, fitted with revolving brooms, swept 14,000 square yards of wood paving per hour, distributing the water once, or about half the area if the surface had to be washed twice and cleaned with

a squeegee. This included the time used in filling tank for every 2,500 square yards watered. Two machines could take care of all this kind of work and the annual cost would amount to about $2,500, including capital outlay, repairs, insurance, maintenance and wages, as compared with $6,500 per year for nine horses and men for the horse-drawn vehicles.

With loads of from five to ten tons and trips of from two to four miles, the economy of the motor-wagon depends on the rapidity of loading and unloading. The ideal work for the motor consists in carrying loads of from five to ten tons ten miles or more. Experience thus far seems to show that for hauling seventy-five tons or less, the horse-drawn vehicle is the more economical, but for larger amounts and little delay the motor-wagon is cheaper.

Regarding the kind of motor-wagon to use, the author favors the steam vehicle for municipal work, as it is not only more reliable, but the objection of trouble in securing water does not apply in the case of the short hauls required by municipal work.

Wide Tires Protect the Streets

At the present time there is an admirable wide tire ordinance in existence here in St. Louis. It was framed back in the days of Gen. Turner's administration as President of the Board of Public Improvements, and was framed after conferences between the transfer companies, wagon makers and other interests. This ordinance did not become completely operative until a year or more after its passage, and even then it was not lived up to. The city officials last spring insisted that this ordinance should be observed. Immediately there was a demand for its repeal, and an ordinance to that effect was introduced. This League asked for a public hearing on the matter before the Council, taking the broad position that wide tires were a good thing for the protection of streets and a saving to taxpayers. For these reasons the League objected to the repeal of the ordinance, but stated that it was perfectly willing to have the present ordinance amended if it proved a hardship to any one class of wagon owners; but we would not agree to having it repealed outright with no effective ordinance in existence. Since that time the League has met various committees from the team owners in an endeavor to compromise. The League is willing to agree to an amendment which provides for a slight reduction in the width of tires on wagons equipped with springs, but other wagons must be built to conform to the present scale. The time for complying with the present ordinance was extended until the 1st of January, 1904, and will be enforced unless some other ordinance is substituted.—*Civic Improvement Bulletin*, St. Louis.

Financial Status of St. Joseph

A decrease of over $100,000 in the bonded debt of St. Joseph, Mo., is shown in the last report of City Comptroller Johnson. This was caused by refunding an issue of 6 per cent. bonds that had run twenty years. The collections in all departments amounted to $482,858.11. The sinking fund had a total of $152,315.27, from which $124,826 was used to take up old bonds and a balance of $27,264.27 was left. The land tax netted $184,889.09; the personal tax, $82,-684.18; licenses, $54,002.03; penalties, $491.16, and miscellaneous collections, $22,034.50. The present bonded indebtedness of the city, after the bonds were cancelled, was only $965,450 at the time of the report.

Statistics of Arc Lighting in United States Cities and Towns

	Population, 1900.	No. lamps.	Watts at lamp terminals. Open.	Watts at lamp terminals. Closed.	Schedule. Open.	Schedule. Closed.	Hours burn per year.	Cost coal per ton.	Contract price per lamp per year.
SOUTH DAKOTA (Concluded)									
Huron	2,793	...	11	...	430	(2)(3)	1,200	$5.00	$78.00
Lead	6,210	15	...	480	...	(1)	4,320	5.50	180.00
Mitchell	4,055	16	1	340	...	(3)	1,825	5.00	96.00
Pierre	2,306	25	...	340	...	(3)	1,460	Gas	z
Sioux Falls	10,266	27	...	480	...	(1)	4,000	3.50	129.00
Spearfish	1,166	3	10	480	550	(1)	4,000	W. P.	180.00
Sturgis	1,100	...	3	...	...	(1)	4,000	Wood	168.00
TENNESSEE									
Brownsville	2,645	...	4	...	430	(2)	2,179	2.75	84.00
Chattanooga	30,154	209	...	480	...	(1)	4,000	1.55	87.00
Clarksville	9,431	...	52	...	...	(1)(2)	2,600	1.50	73.00
Cleveland	3,858	20	...	480	...	(1)	4,000	2.00	96.00
Columbia	6,052	53	...	340	...	(1)	4,000	2.45	88.00
Knoxville	32,637	292	...	480	...	(1)	4,000	1.25	80.00
Martin	1,730	...	8	...	550	(3)	1,825	2.05	60.00
McMinnville	1,980	...	26	...	430	(2)(3)	1,500	1.75	z
Memphis	102,320	434	50	...	430	(1)	4,100	2.20	85.00
Paris	2,018	...	24	...	550	(1)(2)	2,179	1.38	60.00
Rockwood	2,899	30	...	340	...	20(1) / 10(3)	4,000 / 2,000	1.25	72.00
So. Pittsourg	1,789	...	13	...	...	(1)	4,320	1.50	116.00
Springfield	1,732	...	15	...	...	(2)(3)	1,220	2.45	60.00
Sweetwater	1,716	...	22	...	...	(2)(3)	1,220	1.25	62.50
TEXAS									
Beaumont	9,427	...	22	...	...	(2)	1,800	Oil	90.00
Bonham	5,042	...	4	...	550	(1)	4,500	2.65	52.00
Brenham	5,968	30	2	340	...	(1)	4,000	5.75	102.00
Brownwood	3,965	...	4	...	430	(1)	3,600	5.00	120.00
Bryan	3,589	5	...	340	...	(1)	4,000	3.75	72.00
Cameron	3,341	...	7	...	430	(2)	2,179	1.10	120.00
Crockett	2,612	...	5	...	430	(2)	2,179	1.32	84.00
Dallas	42,638	...	500	...	480	(1)	4,000	2.95	83.75
Denison	11,807	54	...	480	...	(1)	4,000	2.25	96.00
Denton	4,187	...	5	...	430	(2)	2,179	2.25	90.00
Farmersville	1,856	...	2	...	...	(1)	4,000	3.50	108.00
Ft. Worth	26,688	64	...	340	...	(2)	2,255	2.50	z
Greenville	6,860	35	...	480	...	(2)	2,179	2.50	z
Marlin	3,092	...	12	...	430	(2)	2,179	1.65	120.00
Paris	9,358	100	...	340	...	(2)	2,179	2.75	70.00
Plano	1,304	...	7	...	430	(1)	4,380	2.25	120.00
Port Arthur	900	...	5	...	430	(4)	2,250	(5)	96.00
San Antonio	53,321	328	...	480	...	(2)	3,300	3.00	90.00
Terrell	6,330	...	6	...	550	(1)	4,000	2.25	150.00
Tyler	8,663	...	6	...	430	(1)	4,567	5.00	108.00
Waco	20,686	154	...	480	...	(1)	4,000	2.65	120.00
Waxahatchie	4,215	...	4	...	550	(1)	3,910	3.75	120.00
Weatherford	4,786	...	1	...	...	(2)	3,900	3.00	100.00
Wichita Falls	2,489	...	6	...	430	(2)	2,600	3.50	100.00
UTAH									
Mt. Pleasant	2,372	...	12	...	430	.....	2,190	W. P.	87.00
Salt Lake City	53,531	425	...	480	...	(1)	4,000	W. P.	72.00
VERMONT									
Barre	8,448	68	...	340	...	(2)	1,135	W. P.	36.00
Bennington	5,656	65	...	340	...	(2)	3,000	4.80	76.00
Brattleboro	5,237	50	...	480	...	(2)(3)	1,220	4.90	80.00
Burlington	18,640	171	...	480	...	(1)	4,000	5.00	80.00
Lyndonville	1,274	39	1	340	...	(1)	4,000	W. P.	z
Middlebury	1,897	26	...	480	...	(3)	1,350	W. P.	60.00
Montpelier	6,266	...	84	...	480	(1)	4,000	W. P.	70.00
Morrisville	1,262	22	...	480	...	(3)	2,100	W. P.	z
Proctor	2,013	16	...	480	...	(2)	2,179	W. P.	66.67
Richford	1,513	11	...	480	...	(2)(3)	1,300	W. P. (6)	50.00
Rutland	11,499	132	...	480	...	33(1)	4,000	3.70	91.25
St. Albans	6,239	79	...	480	...	(2)(3)	1,385	4.50	75.00
St. Johnsbury	5,666	70	...	480	...	(1)	4,000	6.00	64.25
Springfield	2,040	29	...	480	...	5(1)	4,000	5.05	98.00
Vergennes	5567 / 1,753	23	...	480	...	(3) / 24(2)(3)	1,825 / 1,220	W. P.	44.00 / 60.00
Winooski	3,783	20	...	480	...	(1)	4,000	5.00	80.00
VIRGINIA									
Abingdon	1,306	...	20	...	...	(1)	4,000	2.50	60.00
Sharlottsville	6,449	...	85	...	550	(1)	4,000	2.75	50.00
Clifton Forge	3,212	38	...	480	...	(1)	4,000	2.50	90.00
Fredericksburg	5,068	44	...	340	...	(2)(4)	1,800	W. P.	60.00
Hampton	2,764	...	86	...	430	(1)	4,000	2.75	80.00
Lynchburg	18,891	267	51	480	...	(1)	4,000	2.85	58.40
Newport News	19,635	...	86	...	430	(1)	4,000	2.65	44.87 / 42.50
Norfolk	46,624	308	...	340	...	(1)	4,000	3.05	58.00
Petersburg	21,810	206	...	340	...	(1)	4,000	3.00	57.00
Radford	3,344	45	...	480	...	(2)	2,021	2.40	78.48
Richmond	85,050	600	...	340	...	(1)	3,800	3.00	58.50
Roanoke	21,495	155	...	480	...	(1)	4,000	2.75	76.65
South Boston	1,851	14	...	340	...	(2)	2,179	4.00	z
Suffolk	3,827	26	...	340	...	(1)	4,400	3.75	75.00
Winchester	5,161	75	...	340	...	(1)	4,000	2.75	55.00

(1) All night. (2) Moonlight. (3) Midnight. (4) Up to 1 or 2 A. M. The difference in time may be judged from the column showing number of hours lamps burn. (5) Gasoline. (6) Steam. (7) Sawdust. z Municipal.

The above data were collected by the General Electric Company, Schenectady, N. Y.

(To be concluded.)

NEWS AND PRACTICE AMONG THE CITIES

Important Opinions on Sewage Purification—Illinois Clay Workers Meet—Bill to Give Baltimore a Sewer System—Good Roads in New York

Illinois Clay Workers Hold Annual Meeting

THE Illinois Clay Workers' Association held a most successful meeting at Danville, Ill., on January 5 and 6, almost the entire strength of the organization being in attendance. The sessions were held at the Plaza Hotel and a hearty impetus was given to the clay industries of the State by the perfect harmony that prevails, as usual, at these gatherings, the spirit of the association being "what is good for one is good for all."

A feature of the convention was the presence of a number of clay workers from out of the State, many of the Indiana manufacturers considering themselves eligible to the benefits and pleasures of the association, which is always pleased to receive them. There was some talk at the banquet, held on the evening of the 5th, of forming a tri-State alliance.

Buffalo's Finances

THE condition of the treasury of Buffalo, N. Y., was in a most satisfactory condition at the end of the last fiscal year, according to the Comptroller, Hon. Frederick R. W. Herrwagen. He gives credit to all the departments for keeping within the estimates and in some cases, stated that, a large amount of unexpended balances was turned back into the General Fund. Laws enacted during the past year enabled the Comptroller to straighten out the old tax accounts which were carried as assets for over forty years and, unless mismanagement on the part of future comptrollers, the account cannot get into bad condition. At the end of the fiscal year, June 30, 1903, there was, in the treasury, a balance of $894,482.46. The total receipts for the year were $10,358,084.57, and the total payments, $10,362,126.92, the balance of the previous year and the Local Fund account swelling the balance. The report of the Aldermanic Finance Committee, in commenting on the report, mentioned the improvements that had been brought about in the financial system during the past two years from the untiring efforts of the Comptroller and suggestions of Mayor E. C. Knight.

Board of Works for Charleston

ONE of the first acts under the new municipal administration in Charleston, S. C., was the introduction of a bill into the Council for the establishment of a board of public works. Mayor Rhett was behind the measure which provided for a board of nine members to consist of the Mayor, two members of the Council and six tax-payers of the city to be appointed by the Mayor, two of the six members retiring every two years, and their successors serving for six years. All the powers vested in the Committee on Streets were to be transferred to this board, as well as the duties performed by the committee. The purpose of the bill, according to the Mayor, is to do away with the patchwork condition of the street paving, which has been laid without any regard to continuity of any material. Heretofore, each member of the committee felt he was entitled to expend a certain proportion of the appropriation for streets as he desired without regard to the rest, the division of appropriations being made among the wards irrespective of the needs. He stated that a block at one time had been paved except in front of one house in which there were no voters. The new board would work for a uniform system of improvements, and lay paving where most needed.

Commission for Baltimore Sewer System

THE bill approved by Mayor McLane and the Municipal Board of Estimates of Baltimore, Md., providing for a sewer system for the city, plans for a loan of $10,000,000 for the work. A commission of six citizens, three of each party, and the Mayor, who is to appoint the commission with the consent of the Common Council, is to have supervision over the construction of the system. This is to be built by contract, with the right to do certain portions of the work by day labor upon the recommendation of the chief engineer and approval of three-fourths of the commission. All work so done is to be under regulations of the commission. The commission is to have the right to require corporations owning pipes, mains, etc., in the streets to shift the same wherever they might interfere with the sewers. The discharge of sewage into the Chesapeake Bay and tributaries is to be prohibited. Provision is to be made for a tax levy to create a sinking fund and for interest on the loan.

Improvements in Reading Water Works

THE Board of Water Commissioners of Reading, Pa., found that the financial condition of the department was most creditable, with a cash balance of $43,938.42 for the past year. The Antietam Lake supply will be filtered as soon as the necessary filtration plant is ready. The land has been purchased for the plant, but the necessary legislation must be passed by the Council looking toward the erection of the plant. A slow sand filter was constructed for the Egelman supply, the work being done by day labor. The cost, exclusive of the land, amounted to $10,833.17. About $5,000 is needed to complete it. When done it will filter 500,000 gallons per day. The commissioners ask additional authority to place meters wherever necessary. There were many abuses by consumers on the flat rate basis which can be corrected by the use of meters. Superintendent E. L. Nuebling calls attention to the fact that, while little trouble was evident during the year from electrolysis, this does not indicate that the deterioration of the pipes from electrolysis is not going on. There was an increase in the average daily water consumption over the previous year of 1,210,000 gallons. The average daily per capita consumption was 107.3 gallons as against 95.5 for 1901-2. The smallest consumption was on Sundays, owing to the suspension of the manufacturing industries. The cost to the department for maintenance, including taxes, interest, etc., was an average of 2.38 cents per 1,000 gallons, or 8-100 of a cent more than the year before.

Ordinance to Prevent Street Accidents

TRAFFIC conditions on New York's streets have been considerably better since former Deputy Police Commissioner Piper introduced some of the London methods of handling traffic and new rules, while not in accordance with Captain Piper's suggestions, were adopted recently by the Council and were printed in part of the last issue of THE MUNICIPAL JOURNAL. That even the London regulations are not perfect is shown by the continual improvements instituted by the authorities as the needs require. One of the latest improvements to minimize the danger of accidents is an ordinance in the interests of the street railways and aimed at street vans. After the 1st of May, no vehicle is to be permitted on the London streets "unless it be so constructed that the driver thereof shall have a full and uninterrupted view of the traffic in front and abreast of him on each side." The fact that covered vans were the cause of 1,280 accidents last year shows how necessary is the new law, at any rate, in London streets.

Importance of Parks Underestimated

SOME pertinent remarks were made in the recent report of the Park Commissioners of Holyoke, Mass., which other cities should heed as well as that New England city. The Commissioners stated that they were allowed only enough for bare maintenance of the simplest kind and so nothing could be accomplished. The following statement appearing in the report is applicable to many other cities where the importance of a parks system to the health of the citizens is entirely underestimated: "That the citizens of our city will have just cause to regret the action of our city fathers in failing to do their part in not providing sufficient funds for such additions and developments, there will be no doubt, for the time is not far distant when public sentiment will be aroused and demand larger and better recreation grounds and the question then will be not where are we to get the money but where can we obtain the land. Each year sees the absorption of available lands for that purpose by citizens and corporations who are erecting buildings thereon and we shall finally be obliged to establish our parks outside of the city limits, but which cannot take the place of parks within."

More Barber Shop Regulations

THE need for better regulation of the sanitary condition of barber shops has resulted in the adoption of ordinances in a number of cities looking toward better conditions. The New York State Board of Barber Examiners has adopted a set of rules to be enforced in every barber shop in the State. City ordinances in line with these rules will not be repealed, but will supplement the State rules. The rules for barber shops adopted last August by the Health Department of New York City, and printed on page 112 of the September number of THE MUNICIPAL JOURNAL, are practically the same as those of the State Board, although somewhat more stringent.

The cities of Hoboken and Atlantic City, N. J., have made regulations similar to those in New York. The rules in the former city are the same as New York's with the additional clause that no one shall be permitted to use a barber shop for sleeping apartments. The latter city's regulations do not prohibit a barber, other than a licensed physician, from prescribing for a skin disease in New York.

Toledo, O., has adopted rules for barbers such as are in force in New York, requiring also, that all shops must be provided with running water and have all basins connected with the sewers and be properly trapped.

Good Roads Improvement in New York

A STATEMENT showing the amount of good roads built to date under the New York State law and issued by State Engineer Bond, gives the total State appropriations for the years 1898 to 1903 at $2,065,000.. The counties in which the roads were built contributed $5,540,587. A total of 298 miles of road was completed within this period, 1,252 miles were adopted by the counties, and 4,143 miles were petitioned for by them. One-half of the necessary amount for the improvement of these 1,252 miles of road has been appropriated by the counties where they are to be constructed. Up to January 1, 1904, the State provided money for one-half of 485 miles of this 1,252, leaving 767 miles yet to provided for. Of the 485 mills, 298 have been completed and about 187 are under contract to be finished in 1904. The other mileage will be taken care of when the Legislature provides the funds to pay the State's share. Ulster leads the counties in amount of money ($689,774) appropriated for its half of the cost of roads for which plans have been approved. Monroe county comes next with $515,565, although it has had completed the greatest number of miles of good roads. Orange county has appropriated $442,724 and other counties, forty in number, smaller amounts.

Important Opinions on Sewage Purification

THE discussion of the subject of bacterial purification of sewage at the International Congress of Hygiene and Demography at Brussels brought out the results of personal investigations of several eminent men, among whom was Dr. Dunbar, of Hamburg. Dr. Dunbar's conclusions on the subject were as follows:

1. That tanks for the preliminary treatment, preferably bacterial and anaerobic, are essential for successful removal of fats from sewage and production of ammonia in it.

2. That percolating filters, with continuous admixture of air, are more economical and efficient than contact beds for the subsequent oxidations, including nitrification.

3. That denitrification finally improves the effluent, and that this part of the process is more rationally conducted in a lagoon, or watercourse, than confused with the nitrifying process of expensive contact beds.

4. That it is impossible, without enormous expense, to sterilize the effluents of sewage works, and that it is more practical to purify drinking water, oysters, watercress and the like, immediately before consumption.

The fourth and the last conclusion is of great practical interest, inasmuch as it clearly lays down that, whatever may be the method adopted, bacterial purity as shown by the absence of pathogenic bacteria is not obtainable, and that when the sewage effluent is finally run into water channels, filtration and other methods are necessary, as also is necessary the thorough purification of vegetables, etc., grown on sewage farms before they are consumed.

THE QUAKER CITY'S FIRE DEPARTMENT

Organization of the Force and Methods of Operation—One of the Best in the Country—Opinions of the Chief

*By James C. Baxter, Jr.**

THE days of heroism among the fire fighters of our large cities are not at an end. On the contrary, I think it is safe to say that the men take greater risks in the performance of what they conceive to be their duty than at any time in the history of the paid or volunteer fire departments. No one has a greater admiration for the picturesque and courageous men who constituted the old-time volunteers than myself. I was a volunteer fireman, and I knew the spirit that animated these men.

The same courage that existed then is to be found to-day, the only distinction being that the impulsiveness and enthusiasm of the old days has been modified and brought into subjection by the discipline and the authority which is necessary in dealing with modern conditions. The impression prevails in some quarters that deaths and injuries are frequently caused by the officers of the department who compel the men to take unnecessary risks. This is not the case.

SHOULD NOT TAKE UNNECESSARY RISKS

On the contrary, next to doing all that is possible to preserve the life and property of our citizens, the imperative duty of the chief engineer and assistants is to prevent the men from taking unnecessary risks. If you were to go over the list of killed and injured firemen for a certain period of time it would be found that a large number met with their misfortunes through the direct disobedience of orders.

I once remonstrated with a fireman who had been injured by attempting to do something that he had been warned to avoid. I said to him: "Why did you do this foolhardy act of disobedience of orders?" and he replied, "I did it because I did not care to risk the charge of cowardice. Besides that, the men in another company were taking an equal chance, and I did not care to be behind them in the performance of my duty."

CHIEF BAXTER ON FIRE DUTY

This was literally true, and I could not find it in my heart to reprimand a man who acted under such an impulse. The truth of the matter is that well-meant rivalry still exists between the various fire companies, just as it did in the days of the old volunteer system, except, as I have already said, that it is tempered by necessary discipline and authority.

The list of firemen who were either killed or injured in the performance of their duty during the last year furnishes a roll of honor that any city would have cause to be proud of. In twelve months four of our men were killed and 282 were injured. It is interesting to note that one man was injured on four separate occasions, and he still lives to perform his duty. The question has often been put to me whether these deaths and accidents would not have a tendency to dampen the ardor of the men, and my reply has always been that it does not. In fact, it seems to stimulate the men to still greater efforts, and when they go to a fire they seem to be filled with the same zeal that animates a soldier when he goes into battle to face the guns of the enemy.

ORGANIZATION OF DEPARTMENT

So far as the personality and efficiency of the men are concerned, I think that Philadelphia stands very near the head of the list among the cities of the United States.

The ordinance creating and organizing the paid fire department of the city was passed by councils in December, 1870, and the department was placed in service on the 15th of March, 1871, under the management of seven fire commissioners. When the Bullitt bill went into operation in 1887, the Board of Fire Commissioners was abolished and replaced by the Bureau of Fire under the Department of Public Safety.

There are few cities in the world where the fire department has such a large territory to cover as we have in Philadelphia. The city contains 129 square miles, and all of the buildings in that territory are supposed to be covered by our department. We have 285,000 buildings in Philadelphia, 275,000 of which are dwelling houses.

The advent of the skyscraper in recent years has added to the difficulty and responsibility of the department, but I am happy to say that in nearly every instance we have been able to meet the emergencies that confront us.

The force at the present day consists of a chief engineer and his assistant, ten assistant engineers, sixty-four foremen, sixty-six assistant foremen, fifty-four engine men, fifty-two firemen, twenty-one drivers, thirteen tillermen, and 509 hose and ladder men. The apparatus consists of about 125 steam fire engines, combination hose wagons and chemical engines, two-wheel hose carts, four-wheel hose carts, chemical engines, and hook and ladder trucks.

* Chief of Philadelphia's Fire Department, who wrote this article for the Philadelphia *Sunday Press*.

Besides that we have fourteen fuel wagons, eighty-five six-gallon extinguishers, one water tower, four water towers for aerial trucks and one fireboat. The reserve apparatus consists of about twenty-five other vehicles.

During the past year there were nearly 3,300 fires, with a loss of property of considerably more than $2,000,000. It is interesting to analyze the principal causes of these fires. The largest number due to a single cause came about through foul or imperfectly constructed chimneys, there being 151 of this character.

The other chief causes resulting in each instance to more than 100 fires each came through the explosion or upsetting of coal oil lamps, children playing with matches, electric wires and gasoline stoves. There is an object lesson in this that might be studied with profit by our people. Outside of fires caused by electric wires, the other causes could be largely avoided by ordinary care and precaution.

Building Inspection

The fact that the big skyscrapers are now equipped with ample quantities of hose and a large number of pumps has been of great benefit to the department. The chief of the department and his assistants are required to pay regular visits to the theatres, department stores and big buildings generally for the purpose of inspecting the fire escapes and making themselves familiar with the plans of the interiors of the buildings and especially the location of exits. The knowledge thus obtained is of immense value in case of fires.

When a man comes into the fire department for the first time he is impressed with the necessity of thoroughly learning the rules governing the receipt and transmission of alarms of fire. Under our present system upon the receipt of the first alarm of fire from a signal box the operator at the central station strikes ten blows on the joker, and the number of box is repeated four times on both the joker and the transmitter.

Philadelphia Signal Code

When the chief of the bureau or his assistant arrives at the fire ground he immediately sends word that he is there. After the receipt of this signal the central operator is guided by such special signal as may be given from the fire ground. As a matter of interest I give herewith a few of the signals used by the Bureau of Fires at the present time:

2. On my way to the office.
3. Repeat.
4. Yes.
7. No.
23. I understand you all right.
25. Wait a few minutes.
29. Send to this station (box) fire.
34. Make longer pauses between signals.
35. Chief of Electrical Bureau.
45. Send wagon to box ——.
47. Is there at your station.
48. I am coming home.
51. Chief engineer, Bureau of Fire.
52. I am ready—go on.
54. Who sends that? Give your signal.
63. Did you understand my communication?
64. What is the matter with?
69. Come to this office.
73. Go to telephone and call up.
75. Now on the way.
78. How many alarms have been struck from box ——
82. Where was the last alarm?

Should two distinct fires occur at the same time in any district in which one or more companies respond to both, the first companies on the second alarm cover-up company for company, and the companies that have been covered up return to their stations when the fire is out, instead of going to the other fire. If a second alarm is turned in for the second fire they are required to respond to it.

Duties of Firemen

The duties of a man connected with the fire department are very exacting. One of the most important, probably, is what is known as watch duty. The hours of watch duty consist of four hours each, going through the entire twenty-four. These watches consist of one man in each fire house detailed to perform duty by the foreman. They are directly responsible for accurate receiving and reporting to the commanding officer all alarms of fire and all telephone communications.

On receiving an alarm of fire, they immediately sound the dormitory bell and note the location, and in a clear voice give it to the officer in charge. They are not permitted, under any circumstances, to sleep on watch duty or leave the vicinity of the box unless properly relieved.

One of the rules declares that a fireman shall not be guilty of cowardice nor shirk from duty, and in my own experience covering a period of more than thirty years, I have known of very few men who were guilty of deliberately violating this rule.

The foreman in each engine house has a roll call at 8 o'clock in the morning and again at 7.20 o'clock in the evening, and the shifts are so arranged that six men are on duty at all hours of the day and night. The men are expected, and do, familiarize themselves with the character of buildings in the vicinity of their stations. They make it a point to see that the horses are exercised every day, weather permitting, at some place not over one square from the station.

I am glad to say that the men generally take a very lively and intelligent interest in these fire horses, which are usually animals of great strength and endurance. Some of the horses seem to have almost human intelligence and to take as much interest in the work as the men themselves. The sound of the alarm box is familiar to them, and as soon as the bell strikes they run from their stalls and place themselves in the shafts, ready to be harnessed up for duty.

When a new appointee has been appointed to a fire station, the foreman, or assistant foreman, explains to him all about the apparatus and tools, where they are kept, and what they are used for. He is instructed in the most expeditious manner of hitching up the horses, is told how an alarm of a fire is received, and is generally instructed regarding his duty around the station and at a fire.

All new members of the bureau are also instructed in the use of the sliding pole, and are not permitted to leave the station, fires or any duty without the permission of the commanding officer. The labor of taking care of the horses is equally divided between the drivers by the foreman.

Fuel Wagon Service

One of the most interesting features of the department, and one that is probably not given much attention by the public, is what we call our fuel wagon service. There are fourteen fuel wagon stations in different sections of the city, and they are stocked up with wood and coal for the use of the engines.

As a rule, from ten to fifteen tons of soft coal are kept at these stations, where it can be quickly obtained and utilized in the event of fires in those localities. Telephone stations are located near the water plug at each street intersection where high pressure fire pipe line is laid. These stations are directly connected with the fireboat on the Delaware River front and the Electrical Bureau in the City Hall and are used during fires for obtaining water pressure from the boat.

In my humble opinion, Philadelphia has an efficient fire department. The men are interested in their work, and do not shirk danger when it is necessary to encounter danger for the purpose of saving life or property. It is pretty generally understood now that the position of fireman is a permanent one as long as a man carries himself properly and performs his duty to the best of his ability.

Under our present system it is virtually impossible to dismiss a man except for good cause. When a man neglects his work or is charged with some offense he is summoned before a board of inquiry, who listen to the evidence and then submit the facts in the case to the Chief Engineer, who transmits it to the Director of Public Safety. The Director makes his recommendation and, in case of dismissal, the matter is finally acted upon by the Mayor.

A Model Police Force

The city of Toronto, Ontario, is noted for the way in which it forces public service corporations to pay the city just compensation for the use of its streets. It should be noted also for the model police force which looks after the order of the city. Visitors to Toronto have termed the policemen "models of politeness," and their testimony goes far towards proving the title well earned. The appearance of the Toronto policemen, or constables as they are called, no doubt goes a great ways towards inspiring respect. They wear a tunic fitting close to the waist and trousers having a red corded stripe down the side. The helmet is a conical affair having a deep visor both front and back, and a strap that hangs down in front barely reaching the chin; the club is worn in a sheath suspended from the belt.

The Toronto policeman is always civil to every one, and people seek his assistance for any sort of trouble or perplexity in which they may be. He is often called upon to arbitrate petty disputes between citizens, and a great majority of small cases that would clog the police courts are disposed of upon his friendly recommendations. Of course, if an offense is actionable and cannot be settled out of court, a summons is issued. One police court and one county court take care of all the business of this character in the city. Cases of trespass and annoyance are usually settled by the constable, and his statement that, if it is not settled immediately he must summon the person to court, usually disposes of the matter at once.

In addition to the usual duties of the city policeman, constables attend to the collection of the license fees. They also enforce the liquor laws, and prosecute violations of the same. The sale of liquor must stop at 7 o'clock on Saturday night, and may not begin again until Monday, and it is the universal testimony that there is no humbug about the enforcement of this regulation. The constables also play the part of truant officers, and nearly two hundred and fifty of the members of the department are able to render first aid to the injured. Their methods of preventing the blocking of streets, while most effective, does not cause citizens to dispute their authority, as is often the case in some other cities. Their usual method of directing persons to move along is—"Move along please; the sidewalk must be kept clear." Toronto policemen have but little use for the clubs they carry, and the night force which carries revolvers also, seldom uses that weapon. Citizens seldom dispute the authority of the constable, and he in return rarely abuses his power.

The force is recruited like a military force, any subject of the Crown being eligible, and citizenship in Toronto is not required. Recruits receive $1.35 per day, from which is deducted 5 per cent. for the benefit fund. After serving a certain number of years, a maximum of $2.00 per day may be attained; in addition, good conduct pay of 10 cents per day may be earned for every five years of good record. The chief of the department receives $3,000 per year, and the fees earned by the officers are turned over to the benefit fund. In case of illness half pay is allowed; the other half is turned into the fund, from which pensions are allowed those who are superannuated. Unlike most police forces, members of the Toronto Department are not permitted to have anything whatsoever to do with politics.

The methods of the police court are different from those in the United States in many respects. As a rule the fines are much lighter than is customary here, but the terms of imprisonment are a great deal heavier. The records show that in 1902 there were no cases of homicide; there were only twenty-five cases of burglary and twenty cases of highway robbery.

At present the force consists of 302 men of all ranks, and the entire cost of running the department was, in 1902, $252,257.67.

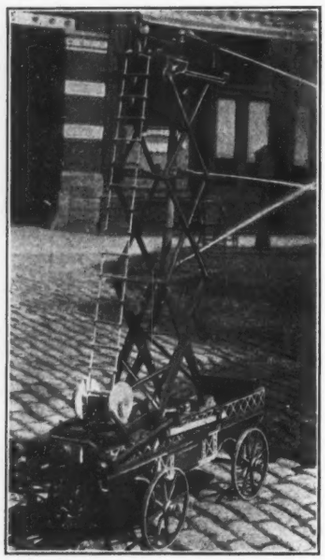
First English Automobile Engine

The first motor steam fire engine to be adopted by a fire department of England was put in service in the town of Leyland some months ago. While there have been some horse-drawn engines in England altered to run by power, this is the first automobile engine to be built for an English brigade. This engine has a quick steaming water-tube boiler, fired by petroleum, and has one pair of cylinders. A countershaft, with clutch, puts the engine in gear with the rear wheels by means of sprockets and chains and the pumps are connected in a few seconds, on arrival at the fire, by a simple device. The pumps are made of gun-metal and can deliver 300 gallons a minute. The oil fuel, to the amount of forty gallons, is carried in cylinders under the box for the hose, and water is supplied to the boiler from tanks on the engine. On the official trial, steam was raised to working pressure in two minutes. Two runs of a mile and of three miles were made and in each case the pumps set to work. Great satisfaction with the performance of the machine was expressed by the chiefs who had assembled to witness the trial. A speed of nearly thirty miles an hour is possible and the engine can climb grades of one in six with ease. Previous to the building of this engine for the town of Leyland, similar engines were supplied by the manufacturing firm to Cape Town, Alexandria, Selangor, Mauritius, etc. The accompanying illustration will give an idea of the character of this engine.

TYPE OF FIRST ENGLISH MOTOR FIRE ENGINE

New Plan for Water Tower

Assistant Chief Thomas Haines, of St. Louis, has invented a combined aerial ladder and water tower, which competent experts say is one of the best and most practical in existence. He has had constructed a working model, of which the accompanying is an illustration.



MODEL OF HAINES WATER TOWER

The ladder is in three sections, and can be raised to a height of about 113 feet, which is the longest constructed. It is operated very quickly by compressed air.

The water tower can be raised by either compressed air or by a single screw, to a height of seventy feet, and on it are platforms every ten feet or so, and on each platform is a nozzle. Streams can be directed into every floor of a building up to six or seven stories in height at close range, and many of the unsatisfactory features of some of the towers now in use, it is claimed, will be done away with in the use of this tower.

It has been examined by experienced firemen, who have pronounced it eminently a success.

Engine Operated by Compressed Air

Chief H. L. Stanton, of Norwich, Conn., who is always studying improvements for his department, has brought forth something new which is of interest and value to the whole fire service; the operating of steam fire engines by compressed air in place of steam.

Recently he had proper connections made with the plant of the Norwich Compressed Air Power Co., and the old round-tank Amoskeag steam fire engine Wauregan was put to the test at Central Wharf.

The air pipe, 1½ inches in size, was laid 500 feet long, and with four valves between the main supply in the street and the engine, the pressure was somewhat reduced. This pipe was connected with a T placed under the whistle, thence to the boiler and engine, which was the only method possible on account of the old style construction of the engine. It was known before starting that the one and one-half inch pipe would not furnish and maintain a pressure of ninety pounds, but the successful working of the engine showed conclusively that with a larger supply pipe of, say twenty feet in length, from the main, the maximum pressure allowed for the engine could have been obtained.

After the machine was draughting water twenty-eight feet with forty-five pounds air pressure and playing three one and one-eighth inch streams through three lines of hose 100 feet in length to a distance of about 150 feet, all three lines of hose were siamesed into one with a one and three-quarter inch nozzle, and a stream of 160 feet was thrown under forty pounds water pressure. No attempt at distance was made, as the object of the test was to see how the engine would work draughting and throwing water by the use of compressed air. The engine was run about an hour and a half, and a singular phenomenon was that within ten minutes after starting the steam pipes to the cylinder were covered with frost a sixteenth of an inch in thickness, and to a persoin standing 100 feet away the exhaust from the stack looked as much like smoke as though there was a fire in the boiler.

Chief Stanton has had this experiment in mind for some time and to furnish sources of water supply in case of the use of the air the old cistern in the front of the Wauregan house and also the one on Union Square have been connected with an eight-inch supply pipe fitted with valves. His plan is for the department to purchase a fire pump of improved pattern and mount it on a low wagon specially constructed therefor to be drawn by one horse. To have pipes from the compressed air mains to such points as the two cisterns named, the steamboat wharf and one or two other points along the river front. A few hydrants in the business section of the city to be supplied with this attachment. The underground connection to have a shut-off and a piece of flexible steam pipe of about twenty-five feet in length to make the connection with the air pipe. This would provide a method of playing a powerful stream of perhaps 1,200 or 1,500 gallons per minute from river, cistern or hydrant.

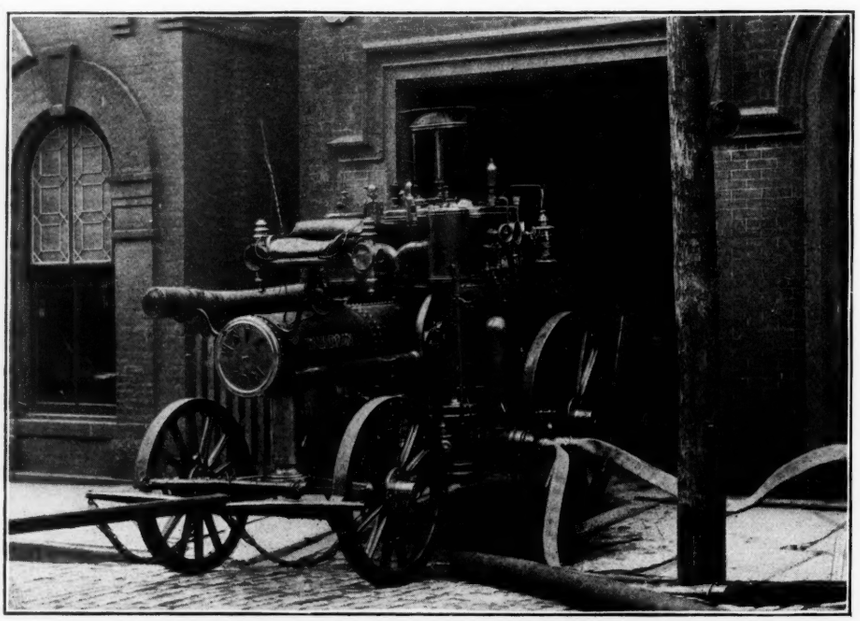
When an engine is obliged to get its water from the river, the boilers foam badly, owing to the presence of sewage in the water. This interferes with the pressure, and is often a serious handicap. This makes necessary, for use with steam pressure, the employment of city water whenever possible. With the use of compressed air no water being needed for steam the foaming in the boiler is obviated.

The use of compressed air would not mean the doing away with steam fire engines in that. But as the present engines are about worn out, it would be the idea to purchase two of smaller size, say 600 gallons each, which could be handily drawn up the steep hills. With these and the air-pump engines, the business section would be amply protected against any large fire.

With the exception of one small system in Canada, this is the only compressed air plant in this country. Its power is made by hydraulic methods. A dam across the Shetucket river four miles above the city turns water into a large iron tube sunk 200 or more feet into nearly solid rock, which maintains an even pressure all over the city of 90 pounds. Many stationary engines throughout the city are now run by this system.

Improvements in Oakland's Department

The total fire loss in Oakland, Cal., in 1903, was a little over $97,000. There were 146 box and 112 still alarms, a number being false. Many improvements were made to the equipment, such as two combination chemical engines, a quantity of hose, two hose wagons, and the adoption of plans for a $5,000 engine house.



ENGINE USED IN COMPRESSED AIR RUNNING TEST

WHAT POLICE AND FIREMEN ARE DOING

General Reorganization of Schenectady's Fire Department—Reports of Police in Atlanta, Schenectady and Haverhill—Fire and Police Personals

Chief After Seventeen Years

AFTER twenty-seven years of continuous service in the Passaic, N. J., police force, seventeen of which he served as head of the force in the capacity of captain, Chief of Police William Hendry takes occasion, in his report, to thank the Mayor and Council for being promoted to the office of chief with accompanying increase in salary. The number of foreigners in the city makes the life of the police an active one, because of the number of disturbances in dance halls and the like. The Chief suggests that proprietors of these places take out licenses, that a better control may be had over them. Hackmen should also be licensed. Licenses should also be required of lodging house keepers as the cheaper grade are but nests for panhandlers and thieves.

Work of Haverhill's Police

THE work of the Police Department of Haverhill, Mass., for 1903, was practically along the same lines as in previous years. City Marshal Frank McLaughlin reports but two instances when the peace was seriously threatened and that was when a large strike was threatened and a gang of safe-blowers invaded the city. The prompt action of the Department prevented extended trouble, but, regarding the latter, the Marshal reminds the city that it may occur again at any time when the professional criminals are driven from the large cities and attempt to make their homes in the small. At least six men more should be added to the force. Four new police boxes, a patrol wagon, and new batteries for the police alarm were recommended. A reserve force was also asked.

Fire Department of Cohoes

THE Fire Department of Cohoes, N. Y., was called out 104 times during the past year, three fires having occurred out of the city limits. According to Chief T. C. Collins, the department consists of one second size Metropolitan engine, two second size Button and one third size Silsby engines, one Hayes hook and ladder truck, three combination chemical and hose wagons and two hose carts and 10,000 feet of cotton rubber-lined hose. All apparatus, except one hose reel in suburban district, is drawn by horses. During the year four additional paid men have been employed, and one volunteer company organized, making a total of eighteen paid men, four call men and 170 volunteers.

New apparatus has been installed as follows: One Metropolitan engine, two double tank (35 gallons each) combination wagons, 3,000 feet cotton rubber-lined hose, one Eastman deluge set, a new switchboard and storage battery system for fire alarm telegraph; seven additional boxes, together with the re-stringing of the wires of the entire system (about sixteen miles). Twelve new horses have been purchased and repairs and additions made to four engine houses. The running expenses amount to about $21,000 a year.

Tacoma Department's Annual Ball

THE twelfth annual bali of the Tacoma Fire Department took place as usual on the last night of the year, and only press of work and failure to recover quickly from the financial straights occasioned by the holidays, prevented our accepting the kind invitation of Chief J. C. Poins and members of the Department to attend. The invitation was printed on a thin piece of wood, the edges of which had been charred and it proved a very attractive, as well as a unique souvenir of the occasion.

Reorganization in Schenectady's Department

A NUMBER of recommendations for the better government of the Fire Department of Schenectady, N. Y., were made by Chief Henry R. Yates to the Fire Commissioners at their last meeting, as hereafter the Commissioner of Public Safety will take charge in their stead. Chief Yates called attention to the lack of interest that is shown in fire matters by the volunteers of the department, at some fires few of them turning out, and so depriving the regulars of their assistance. While not casting any reflections on those volunteers who have done their duty, he recommended that $200 be given to each company yearly for maintenance and that no subscription or sale of tickets for their benefit be allowed and that fifteen or twenty men, selected for their good record, be paid 50 cents for the first and 25 cents for each succeeding hour of service. The other members of companies could be made honorary members and those who are not in it for fire purposes could be given certificates in full. In this way the paid men will receive good assistance and the cost would not be large. The Chief received permission to reorganize the volunteers in the lines suggested. The volunteers also agreed to the plan, which will be that twenty men will be selected from each company who will agree to respond to every call of their company and they will be paid as suggested above. Each company will have $200 from the city and $100 from the insurance companies yearly, but they are not to hold fairs, dances, etc., or solicit funds. The other company members may answer alarms if they desire. As many as possible of the twenty active men will have gongs in their homes and they will be notified of alarms and be permitted to leave their work.

Chief Yates also recommended that a dry pipe line be run to the Mohawk River and the city ponds so that the engines could connect without delay. There were 162 alarms during the year, the loses amounting to $57,886.

The report of Chief of Police Campbell emphasized the need of more men and showed that the neighboring city of Troy had one officer to every 575 inhabitants, Albany, one to every 600, and Schenectady but one to every 1,250. At least 100 men are needed in the department, although good work was done by the small force as proved by the statistics given in the report.

No Cause of Increased Insurance Rates

The firemen of Wheeling, W. Va., serve not only their own city, but also are called upon to help fight fires in neighboring towns, as appears from the report of Chief Robert D. Cline, which showed that eleven outside calls were answered. There has been considerable agitation recently in Wheeling over the increase in rates of the insurance companies, which have added the "pink slip" to policies. The report of the Chief seems to show that this was not justified, as the loss on real estate was $11,491.54 and on personal property, $16,700.96, while the insurance on property involved totaled over $600,000. The manual force consists of the Chief, two assistants and forty paid men. The apparatus in service are one first-class and one third-class Ahrens engine, a third-size Metropolitan, a second-size Silsby, and a chemical engine, four combination engines and hose wagons, a combination chemical engine and hose reel, a ladder truck, an eighty-five-foot aerial truck, four supply wagons, twenty-eight horses, and seventy-eight alarm boxes. There were 202 calls in the city and eleven from outside.

Fire and Police Matters in Atlanta During 1903

More apparatus to enable the Fire Department to keep pace with the growth of the city is asked for in the report of Chief Joyner of Atlanta, Ga. He states that the apparatus cannot be installed any too soon as the tall buildings that are being erected require better service than can be given them now. A water tower he considers an absolute necessity to handle fires in these buildings and he has asked for this apparatus several times. Because the water pressure has been reduced by the extension of the water mains, the addition of several engines is necessary, as the hydrant pressure is not to be relied upon. The Chief asked for $126,396 for maintenance, $16,000 to equip the new No. 9 station, $4,500 for a new engine, and $5,500 for a water tower.

Chief Joyner recommended that all churches be not permitted to have any loose chairs in the aisles, as trouble might occur in a panic on account of them. All the theatres, etc., in the city should be supplied with asbestos curtains, fire escapes, sufficient exits, and fire protection on the stage. During the holiday season a number of firemen are always on duty, night and day, in the business sections, and the lack of great loss during that time is ascribed to the efficiency of this plan. There are now in service three trucks, four steamers, eight hose wagons, and two chemical engines. In reserve are held one steamer and a hose wagon loaded with 1,000 feet of hose. The Chief asks that the city limits be made the fire limits, that the danger from shingle roofs may be lessened. The repair shop has been a source of great saving to the city.

Good order prevailed in the city, according to the report of Chief of Police Ball; no strikes or disturbances of any kind having occurred. A detention ward for white males was asked by the Chief so that those who are arrested, but afterwards proven innocent, may not be placed in cells like felons. The sum of $10,000 was also asked for a new eight circuit office register and to remodel sixty-one call boxes. More men are needed and a pension fund should be established. The force has now 199 men. The bicycle men proved of value, and made 10,183 quick calls during the year.

Fire and Police Personals

—Andrew J. Kirwin was elected Chief of the Newport, R. I., Fire Department for a term of four years.

—The veto by Mayor Collins of the order fixing the salaries of Boston police inspectors and lieutenants at $2,000 a year has been indorsed by the Police Board.

—Despite the opposition of two Concilmen, the appointment of Chief A. E. McCullom as head of the Police Department of Des Moines, Ia., was confirmed.

—Chief W. H. Loller, of the Youngstown, O., Fire Department, has been granted his request for a second assistant chief and an addition of ten cadets to the force.

—Chief William F. Dineen, of the North Adams, Mass., Police Department, was shot and dangerously wounded by Patrolman Northrup, who was enraged at the refusal of the Chief to restore him to duty after he had been temporarily suspended for intoxication.

—The police force of Harrisburg, Pa., on Christmas eve presented Mayor McCormick with a framed group of photographs of the individual members of the force. The entire force was assembled to witness the presentation. The Mayor had previously presented a turkey to each officer.

—Police Captain Daniel Leary was recently appointed acting Chief of the Orange, N. J., Police Department by Mayor Stetson. Chief McChesney had been granted leave of absence on account of sickness after his resignation had not been accepted by the Council. He had requested at the time that Captain Leary be made his successor.

—While the Taunton, Mass., Police Department has never been in better condition, Mayor Warner looks for marked improvement. The fee system in the Department is to be abolished and the money received heretofore as personal emoluments by the officers will go into the city treasury. He recommended a police station, police signal system, and a police matron.

—In his annual message, Mayor Doremus, of Newark, N. J., urged that patrolmen should be given straight beats instead of the irregular circular posts whereby they are held responsible for eight or nine blocks. Men should not be permitted, as at present, to leave their posts before being relieved, as it leaves the posts unguarded and advantage has been taken of this by thieves.

—The salaries of police and firemen of Yonkers, N. Y., was held up by Mayor John Andrus, who would not authorize the City Treasurer to sign the warrants on the day before Christmas on the ground that the salaries had not yet been earned. The usual custom has been to pay all city employees the day before Christmas instead of the last of December and the merchants have always profited by the custom.

—The Board of Public Safety of Cleveland, O., recently voted to amend the rules of the Police Department in order to deprive Chief Kohler of the arbitrary power to punish members of the Department. It was also voted to remove the Chief from the Board of Examiners of the Department and to replace him by the City Solicitor. Similar action was taken in the case of Chief Wallace of the Fire Department. Members of the forces can now appeal to the Mayor from the Chief's rulings and the Board can affirm or modify the Mayor's sentence.

LITERATURE ON MUNICIPAL TOPICS*

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

Books

Highway Construction in Wisconsin, by Ernest Robertson Buckley, Ph. D., is known as Bulletin No. X of the Wisconsin Geological and Natural History Survey. The author discusses the question of highways and pavements in the cities and counties of the State and illustrates his text with a large number of photographs and diagrams. He takes up successively, "The Classification of Highways and the Agents that Destroy Pavements"; "Materials Used in Improving Highways"; "Methods of Constructing Various Kinds of Pavements"; "Drainage"; "Pavements Constructed in the Larger Cities of Wisconsin"; "Abrasion and Cementation Tests"; "Miscellaneous Considerations," such as the relation of the horse, passenger and resident to pavement; and a general conclusion. Cloth, 339 pages, 106 plates and maps, 30 cents.

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Every citizen should possess a copy of *Civics* by George Lewis. It contains information that every citizen should know or have easy access to such as is afforded by this little book. It is a small encyclopedia of civic data, answering a multitude of questions of interest to every one. It gives intelligent, concise and complete information on such topics as taxation, civil service, political parties, the Monroe Doctrine, and other political and historical matters. The topics are arranged alphabetically so that they may be readily found. Price, cloth, 203 pages, 45 cents, net. p. p. c.

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The health departments of cities are, naturally, the most important branches in the make-up of municipal government and, while, unfortunately, other departments seem to receive a greater share of attention, the health department must rise to first place, for all improvements that are continually being made in municipalities, have for their object the health of the citizens. The reduction in the death rate from contagious diseases is sought continually by medical officers, but there is much to be learned yet about antiseptics and disinfectants, and medical officers, to give the best service, must keep up with the latest discoveries and researches of experts. George M. Sternberg, M. D., late Surgeon-General U. S. A., has contributed *Infection and Immunity* to the field of preventive medicine. It has special reference to the subject of infectious diseases and the prevention. All infectious diseases are preventable diseases and how to prevent nearly all of them it is possible to indicate. They still continue their ravages, due to the fact that, as yet, little is done to stop them unless they become especially active. This is due to a lack of general information concerning their prevention, information which can be obtained from this work.

The first portion of this book is devoted to general remarks about disease germs and infection, the channels of infection and the susceptibility to it, disinfection and the tests for it and the various means at hand for accomplishing it, such as heat, sunlight, use of gases, and different chemicals. Chapters are devoted to natural and acquired immunity and to antitoxins. The second part takes up the various important communicable diseases and a chapter is devoted to each one—twenty chapters in all—and the manner in which it is propagated, its importance as regards its death-dealing power, and the methods of restricting its extension, are all given consideration. The importance of a thorough knowledge of disinfection on the part of the general public and especially on the part of those to whom is assigned the care of the public health, cannot be overestimated. The author urges that information such as is contained in this volume be taught the children in the public schools, and it would seem as if the future healthfulness of our cities demanded it. This book treats the whole matter so simply that it might well serve as a text-book in the schools. Copies may be obtained from the MUNICIPAL JOURNAL AND ENGINEER at the publisher's rate of $2 plus 15 cents for postage.

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As a rule the citizens of cities the size of New York know very little about its local history, simply because they have not the time or impulse to hunt out the interesting historical places. Therefore, the subject of historic New York is always a fascinating one, not only to the residents of the city, but to all who ever have visited or hope to visit the Metropolis. *Literary New York,* by Charles Hemstreet, deals with the historic landmarks and associations of the city in relation to the many writers that were natives or made it their home. The author's style is figurative and graceful rather than strong, and his diction, peculiar and odd at times, makes the reading delightful. His introduction of his characters is skilful, but its repetition becomes somewhat monotonous before he changes. Another fault, and the most important one, is the occasional inexactness with which he describes the location of landmarks. In his endeavor to keep any suggestion of the guide-book style from his pages, he fails at times to locate exactly the object of his description. Notwithstanding this, however, the book, embellished with a number of artistic illustrations, will be read with pleasure by many. All the prominent literary figures associated with the city are given attention by the author, who is a well-known authority.

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A book that will be appreciated by city engineers and their assistants, and, in fact, all that are engaged in field work, is *Heany's Field Book.* This is a note-book, pocket size, and made up of ruled paper used in all transit books. On every right-hand page is printed, in faint red lines, a protractor, or circle, composed of short radial lines graduated at 5 degrees. By means of this new addition, sketches may be made rapidly and to scale, thus making them more intelligible than would be probable without some such guide. The book is bound in sheep, with a perfectly flat opening, the paper is adaptable to ink or pencil and the rulings are waterproof. Price, $6 a dozen; single copies, 60 cents. j.

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The thirteenth annual edition of *Hendrick's Commercial Register* has appeared and will be of interest to any one who wishes to buy or sell anything in the line of architectural, mechanical, engineering, contracting, electrical, railroad, iron, steel, mining, quarrying and similar interests. It contains over 350,000 names and addresses of manufacturers, dealers, etc., classified according to their industries and their location in the country. City officers will find it of great value in showing just where to go to have their needs supplied. The price is $6 and copies can be obtained through THE MUNICIPAL JOURNAL.

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Dr. Ely van der Warker, of Syracuse, is the author of a book entitled *Woman's Unfitness for Higher Co-Education.* The fact that Dr. van der Warker is the Commissioner of Schools of Syracuse, besides being a physician of more than ordinary prominence, will make this book an unusual authority. It will, no doubt, arouse an immense amount of criticism, for the subject is handled without gloves, but every deduction and opinion is based upon the knowledge and observations of many years and every fact is well founded. Price, $1.25, net. gp.

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Joseph Tucker, Economist: A Study of the History of Economies. By Walter Ernest Clark. 8vo, 258 pages, $1.50. m.

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Public Relief and Private Charity in England. By Charles A. Ellwood, University of Missouri. 96 pages, 75 cents.

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The Prevention of Consumption. By Alfred Hillier, M. D. Revised by Dr. Koch. English work, illustrated, pp. 226. Price, $1.25 plus carriage. l.

* Any book or periodical reviewed or mentioned in THE MUNICIPAL JOURNAL, or elsewhere, will be sent to any address on receipt of price.

Periodicals

In the January *World's Work* appears the second of the series of articles on public schools that Adele Marie Shaw is contributing. Miss Shaw's article this month was on *The Public Schools About New York* and is written by a trained teacher who is personally investigating the conditions. Her conclusions are: Suburban schools have generally more vigorous life than those of the city; unexpected provincialisms occasionally mark both city and suburban teachers; places known for admirable theory are not always known for excellent practice; the worst feature of suburban schools is the tendency to separate pupils by social position and not by districts. New York, N. Y. Price per year, $3.

The first number of the *Electric Club Journal* is to appear on February 1. This monthly magazine is to be published under the auspices of the Electric Club, of Pittsburg, Pa., but the circulation of the paper is not to be restricted to club members. While the club recruits its members from the employees of the Westinghouse Electric Mfg. Co., the *Journal* is not to be a trade publication of that company by any means. It will be devoted to the papers and discussions of the sessions of the club, and much of the material will pertain to the latest apparatus and newest problems in engineering work The Electric Club has headquarters at 735-7 Penn avenue, Pittsburg, Pa., from which the paper will be published.

The January issue of the *Journal of the Franklin Institute* contains the first portion of an article, *The Belmont Filtration Works,* by John W. Hill, Chief Engineer, Bureau of Filtration, Philadelphia. It is a full description of the filtration works that are to filter the water of West Philadelphia and is accompanied by diagrams and illustrations of sections of the works. Philadelphia, Pa. Monthly, $5 per year.

The issue of the *Proceedings of the American Society of Civil Engineers* for December contains discussions on the *Dock Improvements at Liverpool; Filtration Works for Public Water Supplies, with Especial Reference to the Double Filtration Plant at Bremen, Germany;* and *A Desirable Method of Dredging Channels Through River Bars.* New York, N. Y.

The fifth of a series of nine articles on "Civic Renascence," running in *The Chautauquan,* is *Metropolitan Boston,* by Charles Zueblin, and appears in the January issue. The author claims that it is the civic spirit that carefully guards the interests of the city and its citizens "has made metropolitan Boston the most progressive of American communities." *Crafts in Elementary Schools,* by Matilda G. Campbell, also appears in this number. Springfield, O. Price per year, $2.

The New Reservoir for the Hoylake and West Kirby Waterworks By Alfred J. Jenkins, C. E., Waterworks Engineer, Jersey. *The Surveyor,* London, Eng., December 25, 1903.

Rainfall: Its Observation and Application to the Design of Main Drainage Works. By David Ronald, Boro. Engineer, Falkirk. *The Surveyor,* London, Eng., December 25, 1903.

Facts About the Metropolitan Railway of Paris. Paul Letheule. *Engineering Magazine,* December, 1903. New York, N. Y.

Street Railway Legislation in Illinois. By Edwin Burritt Smith in *The Atlantic Monthly* for January, 1904.

The Mansion House Council on the Dwellings of the Poor. The Lancet, London, Eng., November 28, 1903.

Juvenile Courts. Several papers on these courts in different cities in the *Juvenile Court Record,* New York, N. Y., for December.

The Latest Method of Dealing with Consumption. By Lawrence W. Flick in *The Independent,* New York, N. Y., December 10, 1903.

Some Features of Municipal Ownership. By Henry L. Doherty. Paper read at meeting of American Gas Light Association. *Progressive Age,* New York, N. Y., January 1, 1904.

Acetylene Lighting in the Philippines. American Gas Light Journal, New York, N. Y., December 14, 1903.

Acetylene Town Plants in Germany. L. Kuchel. *Acetylene,* London, Eng., December 1, 1903.

Fire Hazard of Carbide and Acetylene. By Capt. Thompson. *Acetylene,* London, Eng., December 1, 1903.

Lighting Streets by Incandescent Gas Lamps. J. F. Tyndall. *Gas World,* London, Eng., December 8, 1903.

Municipal Electric Plants. Discussion of Policy. *Journal of Gas Lighting,* London, Eng., November 24, 1903.

Prize Designs for London Subways for Gas and Water Pipe. Journal of Gas Lighting, London, Eng., December 1, 1903.

Wireless Fire Alarm Signalling Apparatus. Electrical World and Engineer, New York, N. Y., November 28, 1903.

Sewage Disposal. Chas. H. Rust, C. E., in *Transactions,* Can Soc. C. E., Montreal, Que., Vol. 16, part 2.

Biological Purification of Sewage Matter. Scientific American Supplement. New York, N. Y., November 14, 1903.

Prevention of Contagion in Passenger Cars. Railroad Gazette, New York, N. Y., November 20, 1903.

Description of Dam and Accompanying Works Built for Water Commissioners of London, Ont., at Springbank. J. A. Heaman, C. E. *Transactions,* Can. Soc. C. E., Montreal, Que., Vol. 16, part 1.

Changes in the Settling Basin and the New Hydraulic Dredge of the St. Louis Water Works. E. E. Wall in *The Engineering Record,* New York, N. Y., November 26, 1903.

The Use of Sulphate of Iron at Lorain for Water Filtering. C. A. Brown in *The Engineering Record,* New York, N. Y., December 5, 1903.

Maryland Road Specifications. Extracts. *Engineering Record,* New York, N. Y., November 7, 1903.

American Water Works. Charles Prelini. Conditions affecting water supplies of America. *Traction and Transmission,* London, Eng., November, 1903.

Swansea Municipal Telephones. Electrical Engineer, London, Eng., November 15, 1903.

Surveys for Electrolysis and Their Results. D. H. Maury. *American Gas Light Journal,* New York, N. Y., November 23, 1903.

The Financial Improvement of Electricity Supply Works. J. A. Jeckell, City Electrical Engineer, Coventry, Eng., in *Public Health Engineer,* London, Eng., December 2, 1903.

Water Softening. An inquiry into the working of various appliances. Part 1. By C. E. Stromeyer and W. B. Baron, Manchester, Eng. *The Surveyor,* London, Eng., December 25, 1903.

Character Sketches: St. Louis. In *The World To-Day* for January. Chicago, Ill.

Municipal Reports Received

City Engineer C. H. Rust, of Toronto, Ont., has favored us with a copy of his annual report for 1902.

The report of the City Engineer of Winnipeg, Man., has been received.

The report on Concrete Foundations for Pavements with special reference to the work in Brooklyn during 1902 by the Commissioners of Accounts of New York has been sent us.

We have been favored with the Accountant's Report to Comptroller E. M. Grout submitting a plan for stating the annual report of the Comptroller of New York.

Volume VII., Part I. of the year book of the American Park and Outdoor Art Association containing the record of the annual meeting at Buffalo last July has come to hand.

We have received the twenty-first annual report of the New York State Geologist for 1901.

The first biennial report of the Bureau of Labor and Industry of Kansas for 1901 and 1902 has been received. It contains reports on brick, tile and cement manufacture.

We have received a copy of the Proceedings of the American Water Works Association of the convention held in Detroit last June as published by Secretary John M. Diven, of Elmira, N. Y.

The Mayor's message and the annual reports of the officials of Cedar Rapids, Ia., for 1902, has been received.

The annual report of the Commissioner of Public Safety of Syracuse, N. Y., was sentus by Commissioner Charles Listman.

The annual report of the City Auditor of Providence R. I., has come to hand.

REVIEW OF MUNICIPAL REPORTS

Modern Wood Paving Recommended by City Engineer—Improvements Needed in Atlanta's Water Works—Top Coat for Walks Not Used in Cedar Rapids

Paving Work in Cedar Rapids

DURING the year 1902, City Engineer T. F. McCauley, of Cedar Rapids, Ia., reported that about one mile of paving was finished, of which one-fourth was Purington block and one-fifth asphalt. Both these pavements have given satisfaction. At present the paving comprises 2.18 miles of asphalt and 14.15 miles of brick. The present specifications for sidewalks call for a uniform mixture, doing away with the top coat previously required. A first-class walk is secured when care is taken in finishing and protecting. It is a safer walk during the winter than the other kind. Two miles of sanitary sewers were built, making thirty-four and one-half miles in all. Forty-one hundred linear feet of storm sewers were constructed during the year. The Street Commissioner, Mr. W. L. Moore, recommended that no repairs be made on unpaved streets except with stone. As the city owns a stone crusher, steam roller, scrapers, etc., and as there is suitable stone about the city, he recommended that this stone be crushed for the unpaved streets. During the year three miles of streets and alleys were covered with cinders, an improvement, in his opinion, well worth the cost.

Condition of Atlanta's Water Works

THE story of the water works of Atlanta, Ga., for 1903, is told in the report of Superintendent Park Woodward to the Council. The works turned over to the city the sum of $178,000 in cash as well as supplying numerous free services. During the year, 74,419 feet of mains were laid, making the number of miles in service 147 plus 318 feet. A liberal laying of six and eight-inch mains in the next few years will greatly increase the revenue, said the Superintendent. A number of the small hydrants in the business section was replaced with six-inch and all the 1,425 hydrants are in good condition. New taps in the number of 978 were made, making the total number 11,652. Sixteen miles of mains were laid and the Superintendent expects that 1,200 new taps will be made in 1904. The present charge per tap is $15, which covers meter, meter box, brass goods, piping, etc., but, as the cost to the city is $24, he recommended that the rate be revised. He also recommended that an ordinance be passed prohibiting anyone but employees of the fire and water departments from using fire hydrants. The meter department spent $4,167.63 and collected for repairs from customers $724.60, leaving net cost of $3,443.03. The department set 1,520 new meters, but there are still 3,600 old meters belonging to private parties which should be condemned and replaced. All services, including those for free water, are metered.

A new thirty-inch force main will be laid from reservoir to pumping station to reduce the pressure on the pumps, which need considerable repairing. The pumpage would have been from 10 to 15 per cent. less if the pumps had been in better condition. Mr. Woodward recommends a filtering heater to supply the boilers with clean water at a temperature of 212 degrees, thus obviating boiler cleaning and reducing the consumption of coal. A small shop is also asked as well as a number of smaller appliances. The most important request is for a new reservoir. The cost of pumping amounted to $42,444.31 for 5,824,665,700 gallons and the cost of filtering $4,583.47, or $1.83 per 1,000,000 gallons, using 32-100 of a grain of alum to one gallon of water. Water for washing filters amounted to 77,360,000 gallons and 116,900 pounds of alum were used.

City Engineer Recommends Creo-resinate Wood Paving

IT is the opinion of municipal engineers that sheet asphalt pavements should not be laid on grades exceeding 2½ per cent. rise, according to the report of City Engineer P. L. Schultze, of Utica, N. Y. In consequence, he cautions the Council to consider the grade of streets before selecting the paving material. The amount of new pavements laid during the year was 3.384 miles, a large percentage of which was asphalt. Further on in the report Mr. Schultze said: "The first pavement of creo-resonate wood block in our city was laid on the Rutger street viaduct. This pavement has in late years been successfully laid in many of our large cities and has been adopted by a great many engineers as the proper pavement for bridges. The same company which laid the block on the Rutger street viaduct has the contract to pave the new East River bridge with the same wood block. We also hold a guarantee on this pavement for twelve years, which is two years longer than the guarantee given on any other pavement."

He also remarked that "a few hundred dollars spent on replacing worn out gutters will save thousands of dollars on our asphalt streets and will often prolong the life of an asphalt pavement many years."

Detroit's Park Trees Dying

As usual, the report of the Department of Parks, of Detroit, Mich., is finely illustrated and is a credit to the Department. The Department has been handicaped for the want of a barn and yard in which to keep the horses and storage of the city. Keeping the horses at Belle Isle causes the loss of nearly half a day in going and coming. The establishment of a nursery has proved a profitable investment, some 5,252 shrubs and trees having been taken from it to plant on the parks and boulevards and, in addition, over 22,000 budding plants, the market value of which is placed at $2,400. The appropriation for this nursery for the year was but $2,000. There were added to the general equipment of the system a twenty-five horse power engine and a large portable stone crusher, which have assisted materially in economical maintenance. Several small buildings and drinking fountains were constructed of volcanic tufa. A large number of the hickory trees died in Belle Isle Park, and the botanist, Mr. S. Alexander, found that the trouble was due to the work of boring beetles. Upon consultation with Professors Wheeler and Pettit, of the Michigan Agricultural College and the U. S. Agricultural Department at Washington, the affected trees were removed from the park. Excessive drainage, removal of small trees and shrubs, removal of the leaves from the surface of the ground, and the beetles combined to destroy many trees in Belle Isle Park.

EQUIPMENT FOR CARE OF CITY STREETS

Three Efficient Assistants for City Works Departments—Many Cities Use None but Studebaker Sprinklers—Popularity of "Hoosier" Dump Wagon and Standard Street Sweeper

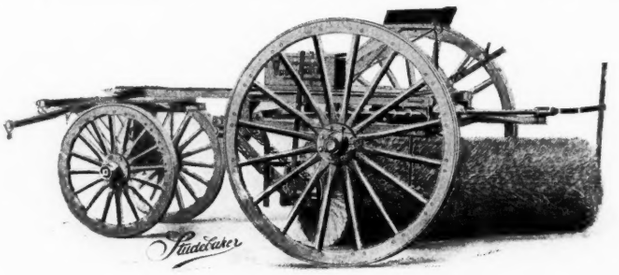
EXPERIENCE is the best teacher, and fifty years of it, supplemented by intelligent study in the construction of sprinkling wagons, has made the name of "Studebaker" known the country over. From time to time improvements have been made on each portion of these sprinkling wagons as the need indicated, but always with a view to making the mechanism as simple as possible. According to the use to which these sprinklers are put have they been constructed, so that the company builds sprinkling wagons for street work, parks, race tracks, lawns or gardens, each kind being best adapted for the purpose.

In the construction of Studebaker sprinklers, as with its other products, a high standard of quality and workmanship is maintained and only the best skilled mechanics are employed in the shops. The tanks used on the sprinkling wagons are of the best quality of tidewater cypress, circular in shape, with a flat surface on the bottom Considerable study has been given the construction of these tanks, and it has been found that the best results are secured by having the staves four inches wide and beaded. The edges are dipped in boiled oil and are put together with dowels. The oil makes them impervious to water, which would cause them to swell and shrink, and the dowels hold them firmly in place. The tank and frame are built together, the frame supporting the bottom of the tank. The hoops, which ex-

STUDEBAKER SPRING GEAR SPRINKLER, WITH NIAGARA SLOT VALVE

tend around the tank, have lugs riveted in the end, and through the lugs and frame are passed bolts by means of which the loops may be adjusted. One of the most important portions of a sprinkler is the sprinkling head, and in the "Niagara Slot Valve" used on the Studebaker wagons, the company feels that it has the most effective as well as a perfectly simple sprinkler. It is made of brass and therefore cannot clog or rust. Dirt from the water cannot lodge in it, as there are no obstructions to catch it. Its perfect simplicity makes it almost impossible to get out of order. The valves are operated by only two foot levers and throw any number of grades of spray, from light to heavy. As there are two valves entirely independent of each other, the driver may use either or both at will. By a simple adjustment, a heavy spray may be thrown on one side and a light one on the other. The sprays are very wide and very even, the four-inch rubber discharge pipes being fed from a single opening in the tank, thus securing the greatest possible pressure. These advantages, together with the well-known easy draft of all Studebaker wagons, make these sprinkling wagons perfect machines. In Catalogue No. 217 are given some views showing the sprinkling equipment of several cities, among which are Salt Lake City, U.; Columbus, O.; Dubuque, Ia.; Cambridge, Mass.; Evansville, Ind.; San Jose, Cal.; Somerville, Mass., and New York City. These views show the popularity of this wagon which are used exclusively in many municipalities.

No less popular is the Studebaker patent street sweeping machine shown in an accompanying illustration. The brooms on these machines may be adapted by the driver to all kinds of street surface, from smooth asphalt to rough cobble-stone pavement, a powerful



STUDEBAKER STANDARD STREET SWEEPER

lever at the right hand of the driver giving him perfect control of the broom. Clean sweeping depends on the ability to adjust the pressure of the broom to the street surface and this feature in this machine will be a strong recommendation in its favor. All boxes and castings are faced where there is friction, all working parts are interchangeable, all bearings are self-oiling and are protected from mud, and all machines are supplied with dust and mud fenders.

The broom fitted to these machines and recommended by the company is the hickory broom. The hickory is set in the roller in a spiral groove by means of a ratline, so that, when the broom is worn out, the roller may be easily refilled by the driver by means of a filling machine made for the purpose. It is found that the hickory is more durable than rattan, and much lower in first cost. In the winter and spring, when snow and ice are on the streets, the company recommends that the wire broom be used.

Our third illustration shows the "Hoosier" dump wagon, which has become so well-known among city officials and contractors. This wagon dumps from the bottom by means of an ingenious device operated by levers, without the necessity of the driver's leaving his seat. The bottom is closed easily while the wagon is leaving the dumping ground, so that there is no necessity of stopping it for this purpose. The wheels have thirty-eight-inch front and fifty-inch rear wheels with wood hubs and tires three and one-half by one-half inches. The wagon is fitted with hound front gear, with either drop or stiff tongue, and oscillating fifth wheel, which will allow the front wheels on either side to drop into depressions in the roadway with-

THE "HOOSIER" DUMP WAGON

out disturbing the level of the body. Brake, steel lining, or steel and asbestos lining, may be fitted to these wagons, but are extras not usually supplied. Fuller details concerning all of the Studebaker products may be secured by addressing the Studebaker Bros. Mfg. Co., South Bend, Ind.

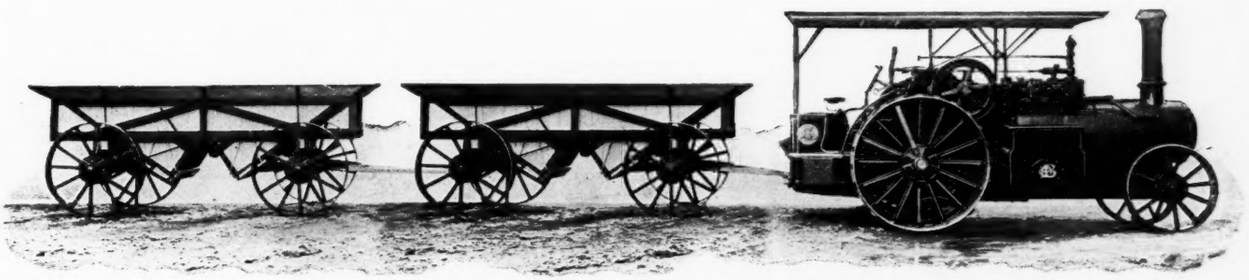
LOCOMOTOR ENGINES CHEAPER THAN HORSES

THE growth of the good-roads movement as well as the large amount of improvement work that is being done by cities, are calling for more powerful road machinery than can be operated by horses, and the traction engine is rapidly replacing the faithful horse, because a larger amount of work can be turned out in less time and at less expense. The motto that has been chosen for its locomotor engines by the Buffalo Pitts Company, of Buffalo, N. Y., is "Cheaper than Horses," and it will be readily seen that the claim is well founded. The expense of running one of these engines per day has been figured out as follows: Engineer, $2.50; fireman, $1.50; 5 per cent. interest on investment, $1; depreciation, 10 per cent., $2; coal, $1.50; total, $8.50. Allowing a little more for incidentals, the entire expense ought to be less than $10 per day. Any one having enough work to keep the engine busy will save money by installing one of these machines. They cost nothing for keep when not in use, and will work as long as is desired, when horses must be fed and care taken not to overwork them.

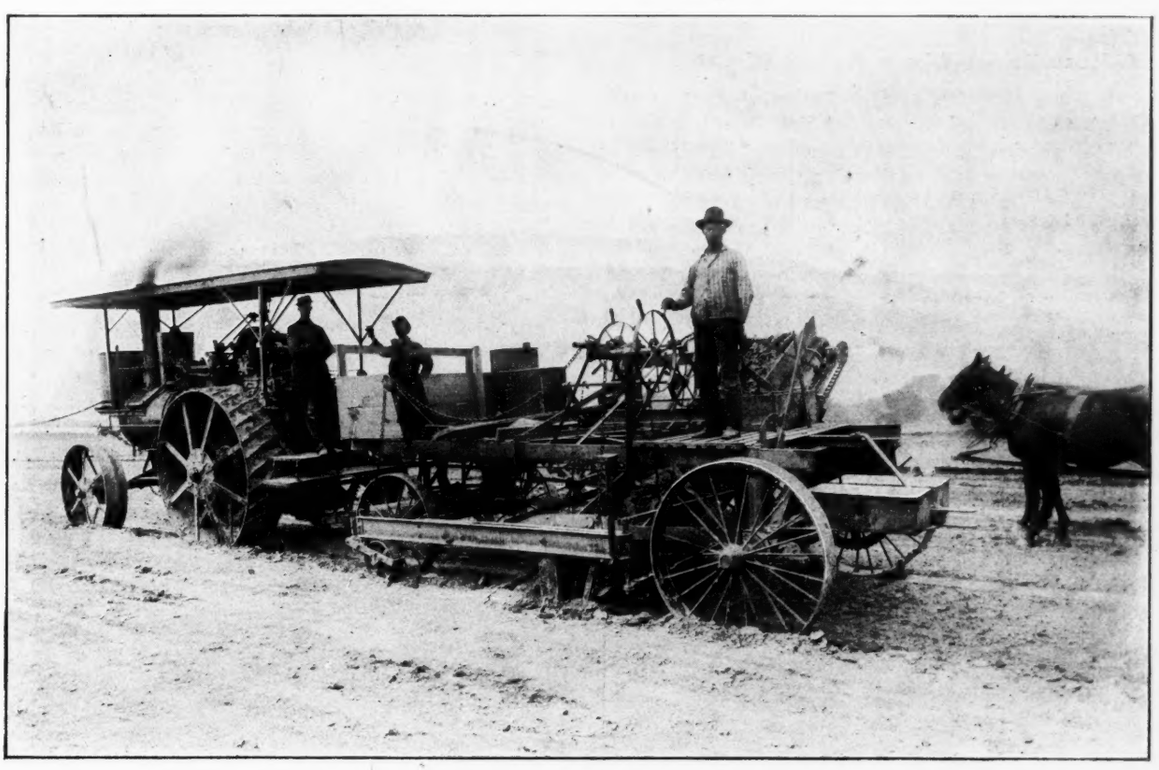
The double cylinder hauling machine shown in the larger of the accompanying illustrations was used for grading on the grounds of the St. Louis Exposition, where horses proved inadequate for the heavy work required. Twenty of these engines were used on the grounds.

The second illustration shows a road locomotive and train of ten-ton cars with stone-spreading bottoms, which have a capacity of several ordinary dump wagons and are thus more economical and, with the aid of the engine, can haul a greater tonnage over roads, than the horse-drawn wagons. The engine is built especially for contractors and those who desire to move heavy loads for long or short distances. It has a rated horse-power of fifty, but is much more powerful, and a speed of three or five miles an hour. The front wheels have a face width of 10, and the rear wheels of 20, inches.

The demand for these engines and cars is not confined to the United States. Contractors in Mexico, Central America, Cuba, the Philippines, South America, and all parts of the world, are finding from the use of these machines that the motto quoted above is true in every sense.



BUFFALO PITTS ROAD LOCOMOTIVE DRAWING TEN-TON STONE CARS



DOUBLE CYLINDER HAULING ENGINE GRADING ON GROUNDS OF ST. LOUIS EXPOSITION

Not in Receivers' Hands

THE American Fire Engine Company is not, as has erroneously been reported, in the hands of receivers, nor will the action involving the International Fire Engine Company in any way affect the American Fire Engine Company, which company, we are informed by its officers, is perfectly solvent and doing a flourishing business. The company recently sold three engines to the city of Milwaukee and a number of other important places, so that the factories at Seneca Falls and Cincinnati are running to their full capacity.

The International Fire Engine Company was placed in the hands of receivers by action of the Court of Chancery on January 6, 1904. The following statement has been made by Sullivan and Cromwell, counsel to the reorganization committee of the International Fire Engine Company:

"This company has for some time been embarrassed for cash capital, and its stockholders have entered into a plan of reorganization, intended to provide the amount necessary to pay all creditors. Owing to the importunity and pressure of certain creditors it was found necessary to take this step to protect and preserve the assets of the company pending reorganization.

"The plan of reorganization has been declared effective, and has been approved by over 80 per cent. of the preferred stockholders and 68 per cent. of the common stockholders. The appointment of the receivers will in no way retard or affect the plan of reorganization. The committee is preparing to make its first call under the plan for the cash subscriptions.

"Mr. Clarke, one of the receivers, is and has been the President of the company since last August, and has the confidence of the stockholders and creditors alike. Mr. Kimball is a resident of Summit, New Jersey, and is well known in business and financial circles, but has had no previous identification with the company."

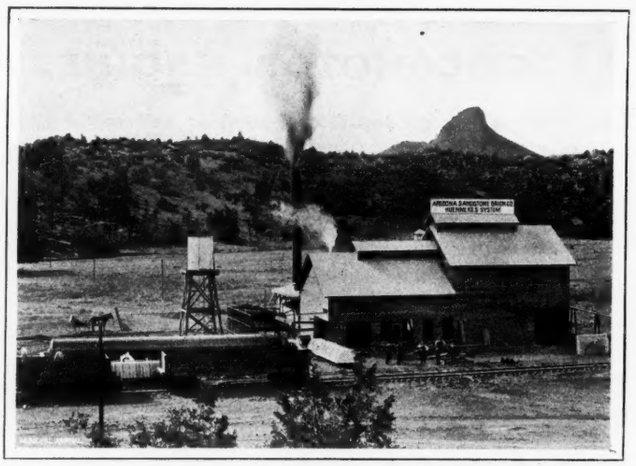
An officer of the International Fire Engine Company stated that he confidently expected that it would not be long before the reorganized company, with greater financial strength and business vigor than the present company, would succeed to the business, which under proper management should be profitable.

The company has, during the past year, expended a large amount of money in improving its various plants which are the largest and best equipped fire apparatus factories in the world.

A New Sand-Lime Brick Plant

FIFTY years ago the idea of making bricks from sand, limestone, etc., originated, but success was not attained until about thirty years ago, when the "Huennekes System" was introduced into Germany. Three years ago the company operating this system introduced its system into the United States, and the business has grown so rapidly that to-day the demands for these sand-lime bricks cannot be met, in spite of the fact that there are nearly thirty plants in operation.

FRONT VIEW OF NEW HIGH SCHOOL, BENNETSVILLE, N. C., BUILT WITH "HUENNEKES SYSTEM" SAND-LIME BRICK



"HUENNEKES SYSTEM" SAND-LIME BRICK PLANT AT PRESCOTT, ARIZ.

One of these plants has been established at Prescott, Ariz., where the Arizona Sandstone Brick Company is turning out sand-lime bricks under the "Huennekes System," and is one of the chief manufacturing industries of that place. Within two months of starting, the demand for the bricks was so large that it was estimated that it would take three months to fill them were no other orders taken. The first bricks were used in building the factory of the company, which cost in the neighborhood of $30,000. Then the new buildings at Whipple Barracks were constructed of these bricks, after they had passed the tests made by the United States Government. Private as well as business buildings have been built with these sandstone bricks, and the way they have been received in Prescott is but an illustration of their popularity in all sections of the country.

A test of the bricks was made at the Prescott Assay Office, when one-eighth of a brick was used, thus exposing a greater portion of the interior. Five crucibles and the brick were placed on bone ash in the furnace and a high temperature was maintained for two hours, after which the crucibles were removed and a gold bar placed beside the brick. The gold quickly melted, the temperature being no less than 3,000 Fahr. The brick was then allowed to cool, and it was found that it was not cracked, although part of one of the crucibles had melted.

Mr. Edward D. Preston, Inspector of Buildings of Baltimore, Md., made tests of the bricks made by the "Huennekes System." The bricks were soaked in water for two days, immediately frozen for twenty-four hours, and then placed at once at the mouth of a hot furnace until they had thawed out. Mr. Preston reported that they showed no evidence of any defect, and were as firm as if no test had been made.

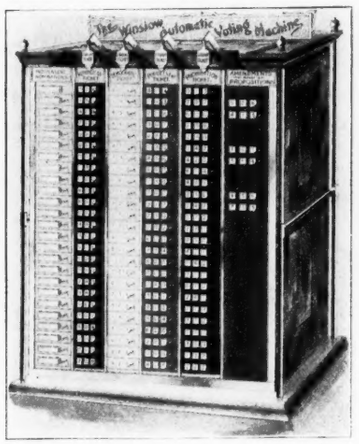
In speaking about the establishing of the plant of the Arizona Sandstone Brick Company at Prescott, *The Arizona Republican* said, on December 21, 1903:

"Before going into the enterprise the gentlemen who compose the company satisfied themselves regarding several things—that the system known as the 'Huennekes system' was the best known; that the bricks would stand every test to which as building material they might be submitted; that they would meet the requirements of the government, which are always rigid; that as facing bricks they are equal to the best made. The bricks can be made in many colors and of many different sizes. In all respects they are equal to stone and in some respects they are superior. They are also much cheaper. It may be said of them that they are beautiful, economical and indestructible. The capacity of the plant is about 20,000 a day."

—Information about the new Lake Shore, Lake Erie & Western Line between Boston, New York, Buffalo and the West is given in the train book of the Lake Shore & Michigan Southern Railway. The route of the famous "20th Century, Limited" is also shown in this booklet, which also includes all the information that travelers need in traveling on the comfortable cars of this road.

The Winslow Automatic Voting Machine

THE sentiment favoring the use of machines for the recording of all votes in public elections is rapidly increasing. It receives occasional setbacks because of the too frequent failure of some machines which have been placed on the market, but the demand for a perfect machine is more persistent than ever. A new machine has been invented and manufactured by a Cleveland concern which seems to answer every requirement and to provide for every emergency. This machine registers and counts the vote for each candidate as cast. It also registers and counts the straight ticket votes and the votes for or against any special propositions, such as constitutional amendments, etc.



A series of public registers is arranged on the outside of the machine in view of the public, showing at all times how many men have voted, how many women have voted, the aggregate number of both men and women voters, and also the total number of persons that have been admitted to the voting booth, regardless of whether they cast votes or not. A blank column at the left of the machine is provided for the independent vote, and the voter may write in the name of the person of his own selection for any office he may choose. Owing to the universal construction of the machine the ordinary mechanism may be quickly adjusted for single office voting, class voting, minority representation voting, cumulative voting, amendment and proposition voting. When the machine is to be used by women voters, or other restricted voters, an ingenius device provides that such voters are not entitled to vote. The makers claim that there is not a system of voting in the United States or Canada that this machine cannot be adjusted for.

In voting for Presidential electors the voters may vote for the electors of the various parties, but are not required to vote a straight electoral ticket, as on other machines. Positive interlocking and limiting mechanisms enable the voter to vote for any or all the candidates which he is entitled to vote for, and prevent him from voting for more than he should. For a machine that is required to do so much it is remarkably simple and herein lies its merit. It requires less instruction and less average intelligence on the part of the voter than the Australian ballot system.

Everything about the machine, except the actual operation of the voting, is automatic. The person wishing to vote enters the booth through a turn-stile, automatically opening the machine. Before him are the various tickets in vertical rows; at the top of each row is a straight ticket lever. To vote a straight ticket the voter simply pulls the lever which locks all other levers and keys automatically. To vote a mixed ticket the lever is not operated but the keys opposite each name are pressed in as desired. When the required number of keys have been pressed in the machine locks, the exit of the voter from the booth replaces all operated parts for the next voter. Opposite each candidate's name on the machine is a small register and at the close of the polls, by the movement of a lever, the entire record of the day's voting is seen at a glance, and the entire result of the election may be known within five minutes.

The officers and directors of the Winslow Voting Machine Company include T. E. Young, M. A. Bradley, Col. H. C. Ellison, Gen. Joseph Wheeler, J. C. McWatters, W. T. Kaserman, W. Parker, B. A. Bruce and Jos. P. Henehan. The enterprise was promoted in Cleveland by C. E. Foster. L. R. Winslow is manager of the company.

Steel Clad Pavements

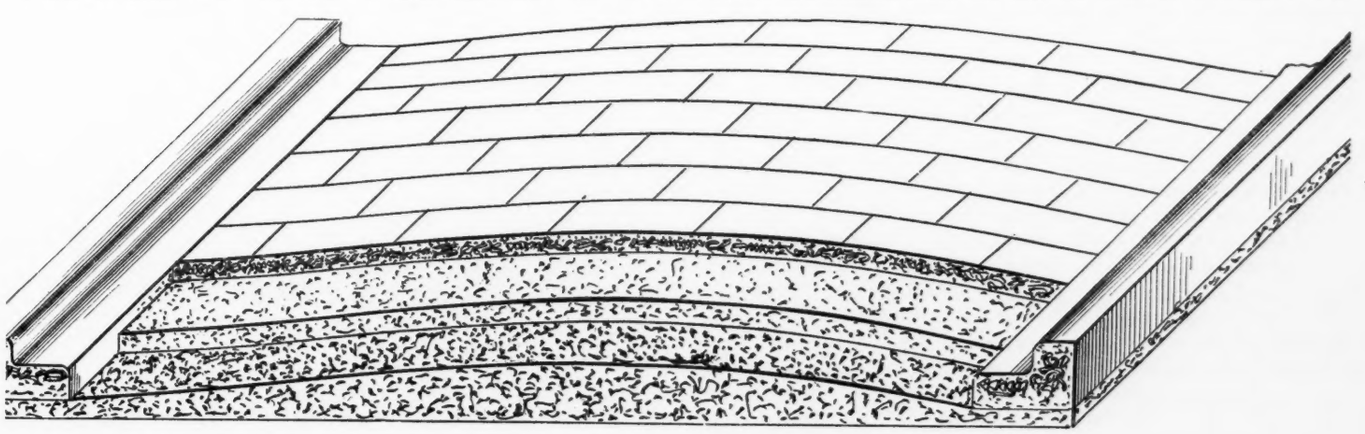
THERE is something new in the paving line coming up all the time, and one of the functions of the MUNICIPAL JOURNAL AND ENGINEER is to keep its readers thoroughly informed touching these matters. For instance, there are many novel features about the "Steel Clad Pavements," made by the Schillinger Brothers Company, North Seeley avenue, Chicago, Ill., in which city officials, engineers, architects and others will be interested. The accompanying illustration and the description following will give a fair idea of what the new pavement is and what it is worth.

The foundation is made in much the same manner as that for any other kind of permanent pavement, the concrete varying in thickness from 4 to 6 inches according to the condition of the sub-soil. Upon this concerete base is set the combined curb and gutter after which the pavement is laid thereon, which consists of a layer of Portland cement concrete 4 inches thick, and upon the latter is spread a steel-clad wearing surface of from 1 to 2 inches in thickness, according to traffic.

For the heaviest traffic the steel-clad asphalt is chiefly recommended. While the first cost is considerably more than for an ordinary pavement, the difference in price will be saved many times because of the saving in maintenance charges and because of the greater durability of the pavement. It is claimed that there is no traffic too heavy for this class of pavement.

Naturally any kind of pavement can be injured or destroyed in the laying, therefore it is always necessary to take the utmost care in the selection of materials and to see that the actual work involved is properly done. Furthermore, in order to prevent prohibitive prices the bidding must be open to all concerns, especially to avoid the ruinous domination of the asphalt trust.

The makers of this pavement court the most searching investigation of the very classes of people whose patronage they want, such as city officials, those who desire a particularly strong pavement around warehouses, milk and produce depots, railway stations, yards, stables—in fact, anyone who wishes the strongest and most durable kind of pavement, one that will withstand the heaviest traffic ever known. The makers claim that they can construct just such a pave-



CROSS SECTIONAL VIEW OF STEEL CLAD PAVEMENT

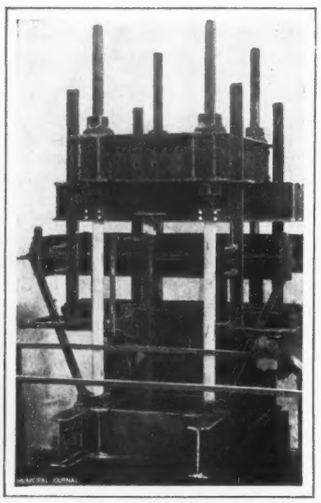
ment and that its integrity will be maintained by any reasonable guaranty.

Steel-clad cement pavements are designed and recommended for use in small cities and towns where light traffic prevails and where the cost is an item for consideration. Recent developments in the manufacture of Portland cement in this country have brought about conditions which make it unnecessary for the small cities and towns to deny themselves the great advantage of good pavements any longer. By the use of the steel clad cement pavements the cost will be within the reach of all.

It is said that when cement is reinforced with a proper amount of steel it will produce an almost indestructible wearing surface. The Schillinger Brothers in constructing their pavement use steel shavings and Portland cement in certain proportions, which give the best results as to durability, traction, etc. To provide for contraction and expansion a steel plate is set into the concrete at proper intervals, which is withdrawn before the cement has thoroughly hardened and the joints then filled with cement or pitch. The wearing surface is provided with half-round grooves to prevent slipping on the pavement.

It is a fact worthy of note that the steel-clad cement pavement can be laid with greater accuracy and with a more even surface, says one engineer who has examined it. The good qualities of the pavement commend themselves to all and while only the briefest description is here given, it will be sufficient to induce those interested to apply to the makers for more complete information as to cost, specifications, etc., all of which will be cheerfully given.

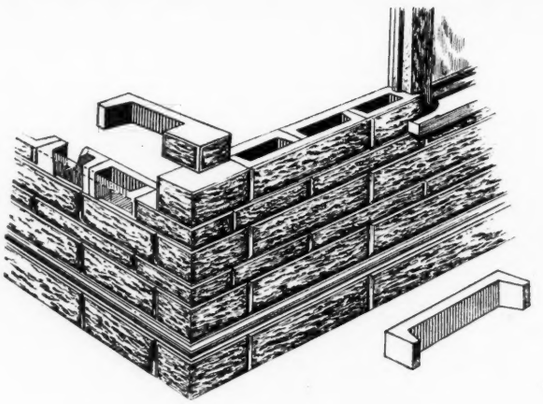
Fisher's Hydraulic Stone System



FISHER'S HYDRAULIC PRESS

The cement age is just commencing and artificial stone is to relegate the natural product to the background because the former is cheaper to secure, more economical to use from avoidance of waste in shaping the latter, and as durable as Nature's product. In order to imitate Nature, however, it is necessary to so compact the materials which make up the artificial stone that all the voids between the particles are driven out. This work can be easily and quickly accomplished by the use of Fisher's hydraulic stone press, which is automatic, acts quickly, and is adjustable to any size of stone. A hydraulic pressure of 200 tons per minute can be exerted on the mixture of sand and cement. These presses are made in four sizes, the accompanying illustration showing one of them. The largest machine has a travel of twelve inches and the 200 tons can be applied at any point. A thin stone requires but one-half inch of travel, while a sewer pipe is compressed from about thirty-one to twenty-four inches, or seven inches of travel. The press can make blocks ranging in width from six to twenty-four inches, and in length from six inches to sixty-four. Four hydraulic pumps of different sizes work simultaneously and apply the pressure in an uneven stroke, producing a tamping, pounding action. A small finishing pump completes the work of the larger ones and leaves the surface of the stone smooth.

The sand and cement, after thorough mixing, are placed in a light mold box of the required size and shape, which is placed in the press and supported against the heavy pressure by the steel sides of the machine. When removed from the press, this box remains locked until the block is carried to the "curing yard," where it is instantly released, leaving nothing but the shaped cement and sand together when the chemical action of the cement has the opportunity of taking place. Angular blocks for forming hollow walls, window sills, etc., are made in this machine, as well as veneering blocks with



SHOWING FISHER HOLLOW WALL CONSTRUCTION

simple imbedments that can be attached to any kind of framework or backing.

These blocks can be rapidly constructed, a few laborers making thousands of them in a day. Any color of stone may be obtained and it takes but a minute in the press to make each block. Further information about this artificial stone, including valuable instructions as to how equip a plant for making them, may be secured from Fisher's Hydraulic Stone System, 384 Second street, Memphis, Tenn.

A Brand New Typewriter

Ever since the four Smith Brothers of Syracuse-voluntarily stepped out of the management of the Smith Premier Typewriter Company, on February 10 last, and announced that they had determined to create and put upon the market a high-grade typewriter with visible inscription, the world of typewriter users has been looking toward Syracuse with more or less interest in the development of their plan. If the Smiths had been less prominent in the typewriter trade the step they then took might not have attracted much attention, but as they were the manufacturers of one of the leading understroke machines, their action was a good deal of a surprise to the public. They, however, had been aware for a long time of the increasing demand for machines with visible writing, and set themselves to produce a machine of that character which would be conceded a foremost place

FIRST WING, L. C. SMITH & BROS. TYPEWRITER CO.'S NEW FACTORY

upon its merits. Having satisfied themselves on this point they proceeded with the building of their factory, which is shown in the accompanying illustration. It is eight stories high and half a city block in length.

During the nine months which have elapsed since the Smiths severed their connection with the Union Typewriter Company they have laid out upon the new project nearly half a million dollars. Their factory building is one of the finest factories in the United States, very light, thoroughly sanitary and designed to secure the greatest economy of labor, and comfort and convenience for the workmen.

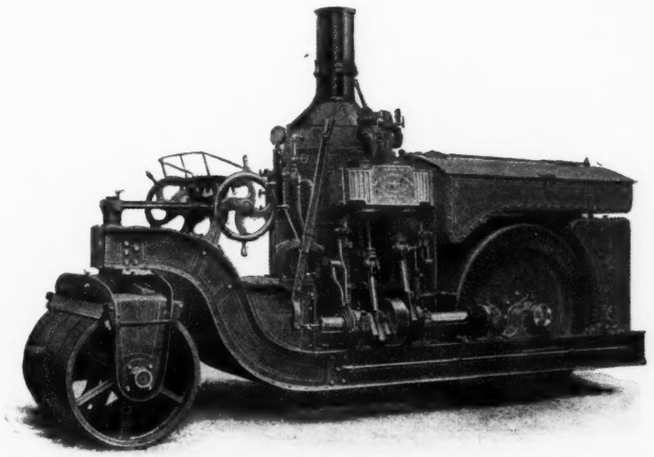
The four brothers, who make up the company, occupy positions with which they are thoroughly familiar. L. C. Smith is president; W. L. Smith, vice-president and factory manager; M. C. Smith, secretary, and H. W. Smith, treasurer of the concern. Their offices and those of the other executive departments occupy the entire first floor of the new building.

A large force of mechanics are at work in the factory producing special tools and machine parts, and the new L. C. Smith typewriter, with visible writing and many other new and progressive features, may be looked for early in the year.

Erie Machine Shops Rollers

FIFTEEN years' experience in building stem rollers should place a company manufacturing the same in the front rank among the makers of paving machinery. The steam rollers constructed by the Erie Machine Shops have been used by the paving fraternity for a decade and a half; the first roller built is still in service and in good condition, and the company points with pride to the fact that while all the machines are guaranteed for a year against breakage or wear resulting from inferior workmanship or material, it has never been called upon to furnish a single part by reason of the existence of defects. Duplicate parts are always carried in the shops to make good the guaranty and to quickly replace any injured part. Placed, as these machines must often be in the hands of men having no mechanical training, it is necessary that they be made as simple as possible, and, in fact, the extreme of simplicity has been reached. All the rollers are duplicates of one another and are of one design.

The frame of the roller is constructed of steel channels curved to form the goose-neck without joint. The channels are 9 inches in depth, and the heaviest made being all in one piece, is much stronger than if there were riveted joints. At the end it is braced by two strong bolts that take all the strain off of the water tank. The extreme length of the frame as well as its form give it exceptional stiffness which ensures perfect alignment of the engines and their freedom of movement at all times. Counterbalanced cranks and stepped gears dispense with the jar on the machinery and enable smooth work to be done. The main axles have an adjustable collar



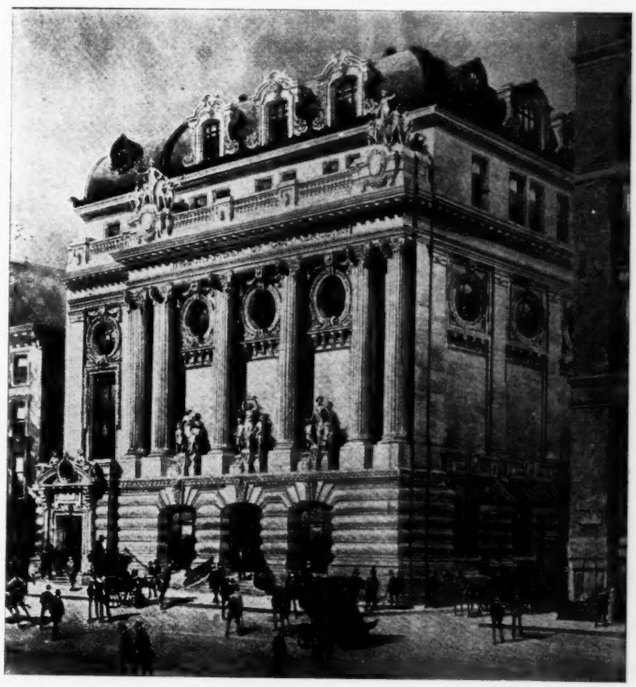
ERIE MACHINE SHOPS' STEAM ROLLER

to take up all wear, an important feature for asphalt rollers. The main bearing is the latest invention of this company and is not used on any other roller. No studs are used to hold on the cap and the weight is entirely on the solid casting.

These rollers are made in eight, five, three and two-ton sizes. The eight-ton roller will appeal to all contractors. It is claimed to be the only roller that has a surplus of power, so that, should the roller be weighted, the boiler is large enough to prevent its lagging. It is 36 inches in diameter, 66 inches high, and has 150 1½-inch tubes. It is tested to safely allow 197 pounds of steam pressure to be used. Further data about these rollers may be obtained by addressing the Erie Machine Shops, Erie, Pa.

Herringbone Lath in Fine Buildings

ONE of the most beautiful buildings erected in New York during the past year is the Chamber of Commerce Building. The fine decorative plastering in this building was done on Herringbone lath, which was selected on account of its adaptability to the varying conditions met with in the style of work in this structure. Altogether there were 50,000 square feet of the lath used in the edifice. A chief feature of the lath is the fact that the edges lock together, making tight, even



HERRINGBONE LATH USED IN DECORATIVE PLASTER WORK ON NEW YORK CHAMBER OF COMMERCE

joints. This prevents the ridges that interfere with the plaster when the edges are lapped. In addition, the lath is self-furring, which makes certain that there is always a perfect "key" to the plaster where the lath crosses the furring strips; the ribs are flattened, preventing the plaster from "cutting." These features, taken in connection with the strength and rigidity of the material and its easy application, have made Herringbone lath a highly scientific article, adaptable to all kinds of construction designed to be covered with plaster or similar substances. Detailed information concerning Herringbone lath may be secured from the makers, The General Fireproofing Company, Youngstown, O.

—While Chicago was in its infancy the sewers emptying into the Chicago River and thence into the lake received but little attention, but as the population increased it was found to be a serious menace to the health of the people, and several alarming epidemics aroused the citizens to a realizing sense of their danger. Necessity, the mother of invention, once more came to the rescue, and thus was conceived the magnificent scheme of enlarging the old Illinois and Michigan Canal by making excavations so deep and wide that it would change the current of the Chicago River, causing it to flow into the drainage canal instead of into the lake.—*From "The Chicago Drainage Canal," by Austin Cook, in Four-Track News for February.*

Wagons versus Carts for Municipal Use

The following table of comparative economy and efficiency between wagons and carts was submitted by the Shadbolt Manufacturing Company to the New York municipal authorities, and while it is a brief in behalf of their particular make of wagon, it, in a measure, voices the advantages of any four-wheeled vehicle over any two-wheeled one. We give it as an interesting presentation of that view. It was not intended for publication, but our use here is sanctioned by Mr. Shadbolt, though not at his desire.

Relative Cost of Maintenance of 15 Wagons and 20 Carts

20 drivers at $2 per day, 300 days	$12,000.00
2 hostlers at $14 per week, 52 weeks	1,456.00
Shoeing 20 horses at $2.50 per month, 12 months	600.00
Stable rent for 20 horses at $20 per year each	400.00
Feeding 20 horses at $16 per month, 12 months	3,840.00
Repairing 20 carts at $20 per year each	400.00
Wear and tear on horses, assuming no horses die, and to sell at the end of four years for $200 less than cost, that is, $50 per year each	1,000.00
	$19,696.00

Cost of Operating 15 Wagons

15 drivers at $2 per day, 300 days	$9,000.00
1½ hostlers at $14 per week, 52 weeks	1,092.00
Shoeing 15 horses at $2.50 per month, 12 months	450.00
Stable rent for 15 horses, at $20 per year each	300.00
Feed for 15 horses at $16 per month, 12 months	2,880.00
Repairing 15 wagons at $40 per year each	600.00
Wear and tear on horses, assuming no horses die, and to sell at the end of five years for $200 less than cost, that is, $40 per year each	600.00
	$14,922.00

Subtracting these totals, $14,922 from $19,696, a difference of $4,774 remains.

Cost of 15 Wagons, Horses, Harness, Etc.

15 Wagons @ $2.75	$4,125.00	
15 Horses @ $2.35	3,525.00	
15 Sets Harness @ $19.25	288.70	
15 Covers @ $5	75.00	
15 Blankets @ $2.75	41.25	
		$8,054.95

Cost of 20 Carts, Horses, Harness, Etc.

20 Carts @ $110	$2,200.00	
20 Horses @ $235	4,700.00	
20 Sets Harness @ $19.25	385.00	
20 Horses @ $5	100.00	
20 Blankets @ $2.75	54.00	7,439.00
		$615.95

Notes of Interest About the Trade

—The Ingersoll Sargeant Drill Co., 26 Cortlandt street, New York, has issued a novelty in the way of a calendar. The design includes pictures showing men at work on a skyscraper with a Haeseler Pneumatic Hammer, while the "Axial" valve is used in a novel manner to indicate the days of the month and also the days of the week.

—Few of the season's calendars are equal in artistic beauty to those sent out by the New York Brick & Paving Company, Syracuse, N. Y.

—Mr. B. M. Deavitt, analytical and consulting chemist and assayer, with a large Chicago practice, has taken charge of the Chicago office of the Engineering Company of America, at 159 La Salle street. Mr. Elias C. Spoker, expert in cement plants, is also associated with the Chicago office of this company. Mr. Edward Everett, C. E., a specialist in railroad work, and who made the survey for one of the Hudson River tunnels, is now associated with the New York office of the company at 74 Broadway.

—The C. O. Bartlett & Snow Company, Cleveland, O., is installing its system of burning coal dust at the works of the McCormick Harvester Co., Chicago, Ill.

—Mr. Irving H. Reynolds, formerly with the Allis-Chalmers Company, and for many years in charge of its pumping engine department, has accepted a position with the William Tod Company, of Youngstown, O., as consulting engineer, and is in charge of the department devoted to the building of large high-duty crank and fly-wheel pumps.

—The following orders have been received by The C. O. Bartlett & Snow Company, of Cleveland, for elevating and conveying machinery: Iroquois Portland Cement Co., Caledonia, N. Y.; Elk Rapids Portland Cement Co., Elk Rapids, Mich.; Grasselli Chemical Co., Cleveland, O.; Struthers Furnace Co., Struthers, O.; Sandusky Portland Cement Co., Sandusky, O.; Sherwin-Williams Co., Cleveland, O.; Cleveland Gas Light and Coke Co., Cleveland, O.; Farmers' Chemical Co., Cleveland, O., and the S. Lorain Coal Co., Lorain, O. Mining machinery has been furnished the Rossland Power Co., Rossland, B. C., by this company.

Publications Received

—The Charles Warner Company, Wilmington, Del., has gotten out a finely mounted panoramic view of its Cedar Hollow and Whiteland Line plants. They are of interest because the former was in operation before the Revolutionary War, and is fitted with its own electric power and light plant and all the up-to-date machinery necessary to turn out the high-class products for which this company is noted. The latter plant has been recently acquired, and is being fitted up to equal the other in facilities.

—How to operate the Ransome Drum Mixers is told in a folder issued by the Ransome Concrete Machinery Co., 11 Broadway, New York. Illustrations show different views of this efficient machine.

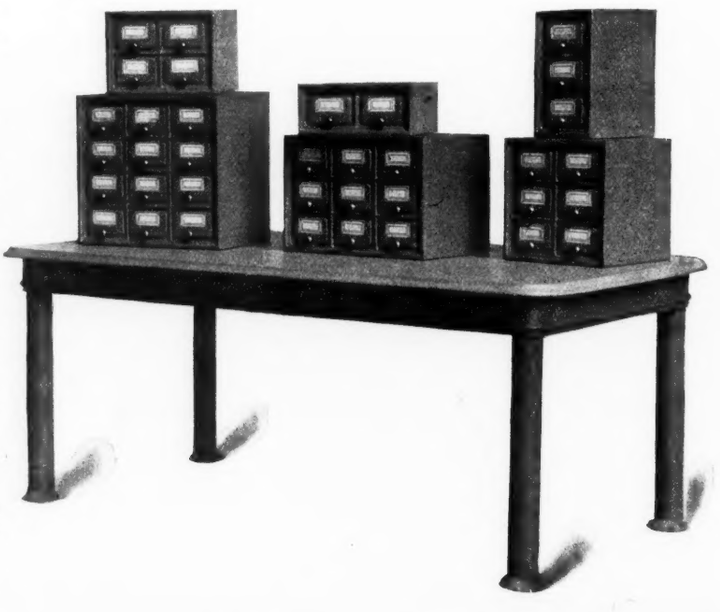
—The general features of the Arthur High Pressure Kerosene Lamp are given in a small folder. The lamp uses ordinary kerosene oil, and is capable of giving 2,000 candle-power. The Arthur Light Co., 117 Walker street, New York, also makes these lamps in a portable form that contractors may use them on their work.

—The American Hydraulic Stone Company, 214 Century Building, Denver, Colo., has issued a booklet illustrating the hand-press in which, with a pressure of 25,000 pounds, are made hollow concrete stone blocks for walls, etc., the process by which these blocks are made, and a few of the many buildings, etc., in which they are in use.

—Chain Catalogue No. 9 has been issued by The C. O. Bartlett & Snow Company, Cleveland, O., illustrating and describing its Interlocking Shoulder Bearing Chain Belts, as well as other specialties of the company.

Berger Metal Office Equipment

The accompanying cut snows one of the many styles of steel office furniture manufactured by the Berger Manufacturing Company, of Canton, O.



CONTRACT NEWS FOR THE MONTH

Including Paving, Sewerage, Water Supply, Lighting, Public Buildings, Sewage and Garbage Disposal, Fire Supplies, Contracts Awarded

N. B.—All news of proposed work sent us by city officials is incorporated in our Weekly Advance News Service and appears subsequently in this "Contract News for the Month" if the date of the reception of bids be sufficiently late to warrant placing the item here.

City officials and others are urged to send us all news of contemplated improvements for use in our Weekly Bulletins which are mailed to those interested.

PAVING, PAVING MATERIALS AND MACHINERY

Akron, O.—Bids will soon be asked for improving streets according to reports. R. F. Hamlin, City Clerk.

Albany, N. Y.—Plans have been prepared for four highways at estimated cost of $191,950. State Engr. Bond.

Alexandria, La.—It was stated that the contract for paving Ninth street was to be let soon.

Allentown, Pa.—Ordinances were passed providing for street paving. City Engineer H. F. Bascom.

Altoona, Pa.—It is said that $229,000 paving bonds were sold.

Atlanta, Ga.—Plans prepared for macadamizing a drive.

Atlantic City, N. J.—Asphalt may be substituted for macadam on the streets of this place.

Augusta, Ga.—Commissioner of Public Works Wingfield recommended that Broad street be resurfaced with brick, asphalt or Belgian block.

Austin, Tex.—Congress avenue will be improved.

Baltimore, Md.—$5,000,000 loan for street paving was the purpose of a bill prepared by City Solicitor Bruce. Estimated cost of widening Light street was placed at $524,731.

Barberton, O.—Estimated cost of paving High street was placed at $21,961.

Bay City, Mich.—Garfield avenue may be paved with brick.

Bayonne, N. J.—Mayor Brady recommended the purchase of a steam road roller.

Bellefontaine, O.—Bids, February 4, for grading and macadamizing Horton Pike No. 2, including over 33,800 cubic yards of excavation, 14,078 cubic yards broken stone. James E. Shaw, Chairman Co. Commissioners.

Belleville, Ill.—Ordinances provide for paving various streets.

Bethlehem, Conn.—Bids, February 16, for constructing a gravel road. Board of Selectmen.

Boonton, N. J.—Estimated cost of opening and improving School street is placed at $6,302.

Boston, Mass.—Plans were approved by Mayor Collins for an 80-foot boulevard. Board of Street Commissioners.

Bridgeport, Conn—May pave Middle street with brick and Main street with brick to replace the asphalt.

Brownstone, Ind.—Bids, February 2, for abolut six miles of roads in three townships. County Auditor A. H. Manuel.

Buffalo, N. Y.—Twenty-one miles of road will be built for which $100,000 was voted by the County Commissioners. Tonawanda street will be asphalted and ten streets are to be paved.

Cambridge, Mass.—Brick will be laid on Inman street.

Canal Dover, O.—Bids, February 2, for paving two streets—about 16,500 square yards of brick needed. H. F. Eppins, Clerk of Board.

Canton, O.—Will probably pave No. Court street with brick. City Engineer P. H. Weber.

Chattanooga, Tenn.—Bids, February 15, for walks and roads at Chickamauga Park, Capt. H. W. French, Q. M.

Chelsea, Mass.—Mayor Willard recommended $25,000 for street and sidewalk work.

Chester, Pa.—Considering extensive street paving. S. A. Crozer, President of Council.

Chicago, Ill.—Estimated cost of asphalt on Halstead street placed at $101,000.

Chicopee, Mass.—May spend $19,600 on street improvements. Supt. Kennedy, Street Department.

Cleveland, O.—May spend $405,000 for street paving this year, and $300,000 for parks. County Commissioners were to ask bids for paving part of State road at cost of $23,400. Ordinances provide for the grading, curbing and paving of several streets.

Clinton, Tenn.—Anderson County will issue $100,000 bonds for pike roads.

Collingwood, N. J.—Will probably bond for paving.

Columbus Grove, O.—Sycamore street will be paved.

Cohoes, N. Y.—Willow street may be paved.

Covington, Ky.—City will probably do some brick and wood block paving. W. E. Gunn, City Engineer.

Davenport, Ia.—Considering the appropriation of $27,500 for street paving.

Dayton, O.—Paving of fourteen streets is recommended by the Board of Public Works.

Des Moines, Ia.—Two streets to be paved with brick.

Detroit, Mich.—Bids, February 1, for about 1,600 tons of refined asphalt. Commissioner W. H. Maybury.

Dunn, N. C.—Will construct a highway from bridge at Duke to this place.

E. St. Louis, Ill.—Ordinance provided for the reconstructing of Fifth street at cost of $47,000.

Elmhurst, Cal.—Roosevelt avenue may be macadamized.

Elyria, O.—The Board of Public Service has plans for Middle avenue boulevard.

Flint, Mich.—Estimated cost of brick on Court street is $10,000.

Fort Wayne, Ind.—Plans being prepared for improvements to various streets. City Engineer F. M. Randall.

Freeport, Ill.—Spring street will probably be paved with brick at a cost of $34,000; Liberty street will be macadamized at cost of $21,000. City Engineer G. W. Graham.

Grand Rapids, Mich.—Plans prepared for Grandville boulevard. Estimated cost of new street work is about $143,345. City Engineer Anderson.

Greenville, O.—Council is considering street paving.

Hutchinson, Kan.—Considering the question of asphalt or brick for paving business streets.

Indianapolis, Ind.—Bids were to be asked soon for Fall Creek and Pleasant Run boulevards.

Kalamazoo, Mich.—Considering the paving of Eleanore street.

Kansas City, Mo.—Resolutions provided for paving several streets.

Kokomo, Ind.—City authorized the expenditure of $60,000 for brick paving.

Lake Charles, La.—It was stated that a vote was to be taken on $70,000 bonds for paving. The Mayor.

Lakewood, O.—Have issued $53,583 improvement bonds for Clifton boulevard.

La Crosse, Wis.—Fourth street will be paved with brick.

Little Rock, Ark.—Considering the paving of eighty-four blocks with asphalt.

Los Angeles, Cal.—Ordinances were passed for improving streets.

Louisville, Ky.—Bids were to be asked for street work by the Board of Public Works.

Marinette Wis.—Several streets will probably be paved two of them with brick.

Massilon O.—Council decided to pave a number of streets.

Meadville, Pa.—Resolutions provided for the paving of two streets. City Engineer W. A. Doane.

Minneapolis, Minn.—Have issued $250,000 for paving and sewers. L. A. Lydiard City Clerk.

Mobile, Ala.—Proposed paving improvements includes the following work: 30,382 square yards asphalt, 51,823 square yards of brick, 11,578 square yards of wood; total cost, $400,896.

Montgomery, Ala.—Council has been considering various street improvements. Madison avenue will be extended.

Natchez, Miss.—Board of Supervisors may issue $50,000 bonds for building roads.

Newark, N. J.—Said to have voted $50,000 for paving.

New Britain, Conn.—Estimated cost of macadamizing East street placed at $7,000.

New York, N. Y.—Have issued $850,000 bonds for paving.

Norfolk, Va.—It was said that $200,000 bonds would be issued for paving.

Pasadena, Cal.—East Colorado street will be paved with asphalt. Bids were soon to have been asked for $50,000 paving on Marengo street.

Peoria, Ill.—White Court and Moss avenue were to be paved.

Portland, Me.—Forest avenue may be paved according to reports.

Portsmouth, O.—Brick on Fourth street will cost $44,094, and asphalt block $65,000. Board of Public Service.

Racine, Wis.—Two streets are to be paved.

St. Augustine, Fla.—Washington street will be paved.

St. Joseph, Mo.—North Sixth street will be resurfaced with asphalt. A macadam road may be built from Grand Island bridge to Wathena. Cost of widening Messanie street placed at $18,000.

St. Paul, Minn.—Cost of paving Summit avenue varied from $32,000 to $175,000, according to material used, which was not yet selected at time of report.

Salisbury, Md.—Considering paving streets. W. J. Downing, Chairman Commission.

Sandusky, O.—Plans were to be prepared for about ten miles of paving. City Engineer Miller.

San Diego, Cal.—May improve two streets. Mayor Frary.

San Francisco, Cal.—Mission street may be widened and repaved according to reports. Board of Public Works.

Savannah, Ga.—Petition called for asphalting of Gaston street.

Scranton, Pa.—Six miles of road in Lackawanna County are to be rebuilt.

Southampton, N. Y.—It was stated that $35,000 bonds voted for paving Main street.

South Bend, Ind.—Three streets are to be opened.

South Orange, N. J.—First street will be improved.

Spencer, Ind.—Bids are wanted, February 1, for improving various county roads by macadamizing, etc. County Auditor Meo. O. Mitten.

Sterling, Ill.—Considering the paving of two streets according to reports.

Syracuse, N. Y.—Considering the paving of Butternut street. City Clerk G. J. Metz. Syracuse brick will be used on South Salina street. Bids were to be asked for paving Marks avenue and Dudley street.

Tipton, Ind.—Contract was to have been let soon for several ditches and gravel roads. County Auditor T. W. Longfellow.

Toledo, O.—$300,000 was to be spent for street improvements.

Tonawanda, N. Y.—The River road may be paved. Mayor Alliger.

Vicksburg, Miss.—Washington street will be paved. City Engineer W. L. Polk.

Wellston, O.—Brick will be laid on First street, Broadway and Ohio avenue. City Engineer.

Weehawken, N. J.—Considering the improvement of Highpoint avenue.

West Chester, Pa.—It is said that many streets are to be improved.

West Hoboken, N. J.—New bids were to be asked for brick paving on two streets.

West Palm Beach, Fla.—Model Land Company is to pave four streets with Miami rock.

Williamsport, Pa.—Mayor Laedlein recommended the paving of parts of five streets.

Winfield, Kan.—Seventh avenue will be macadamized.

Vinona, Minn.—Considering the opening of Lafayette street.

Woonsocket, R. I.—Main and Cumberland streets are probably to be paved at a cost of $45,000. City Clerk.

Wellsburg, W. Va.—A street is to be paved in the spring.

Worcester, Mass.—A number of strects may be paved.

Youngstown, O.—Bids were to be asked by the Board of Public Service for paving a number of streets.

CONTRACTS AWARDED

Bound Brook, N. J.—Moran & Sutton has contract for macadamizing on King George's Highway at $42,959.

Brooklyn, N. Y.—Ovalde Asphalt Co. was low bidder for paving St. Paul's Place with asphalt at $12,770.

Buffalo, N. Y.—German Rock Asphalt Company bid $8,276 for paving Court street.

Champaign, Ill.—John W. Stipes bid $20,629 for paving Prospect avenue, and received contract.

Cleveland, O.—Cleveland Trinidad Paving & Asphalt Company has contract for improving seven miles of Breckville Road at $104,000. Christian Burkhardt received contract for paving Wooster Road at $30,000.

Columbus Ind.—Foulkes-Forbes Company was lowest bidders for paving Fifth street with brick, at $1.57 per square yard, and H. C. Finley, of Hooperstown, Ill., was lowest bidder for paving Washington street with brick, at $1.66 per square yard.

Dallas, Tex.—Daniel Morgan has contract for paving Akard street for $8,000.

Grand Rapids, Mich.—J. B. Hoey has contract for graveling Morris avenue at $4,199.

Haverhill, Mass.—U. S. Wood Preserving Company has contract for paving Haverhill Bridge with wood-block at $5,000.

Houston, Tex.—Reported that Fitzgerald & Ray have contract for paving three streets at $13,000.

Houston, Tex.—Black & Laird, of Dallas, were to get contract for thirty-five miles gravel street paving.

Logan, O.—Logan Brick Mfg. Company has contract for improving several streets at $24,487.

Los Angeles, Cal.—J. Hein has contract for paving Monte Vista street at $2,260; C. W. Shafer had contract for portion of Everett street at $10,146.

Louisville, Ky.—American Standard Asphalt Company bid $1.08 per square yard for paving two streets.

Newark, N. J.—Reported that J. R. Shanley has contract for changing grade, etc., of Hight street and M. & E. R. R. avenue at $4,757.

Newport, R. I.—Charles J. Souderman has contract for grading and road-work at Fort Gieble at $2,325.

New York, N. Y.—Sicilian Asphalt Paving Company was low bidder for asphalt paving under Manhattan approach of Williamsburg bridge at $5,319.

New York, N. Y.—R. C. Hunt, 157th street and Broadway, was lowest bidder for improvement of Mosholu Parkway at $135,345.

Rico, Colo.—A. F. Meyers has contract for Dolores County road, from Dunton to Colk Ovens, at $4,200.

Rochester, N. Y.—H. N. Cowles has contract for paving portion of Driving Park avenue at $12,636.

St. Paul, Minn.—Fielding & Shepley have contract for paving of West street at $69,872.

St. Paul, Minn.—Cost of paving Summit avenue varies from $32,000 to about $175,000. Material not yet decided upon. Jas. Forrestal Company has contract for paving W. Seventh street at $26,588.

San Francisco, Cal.—City Street Improvement Company has contract for repaving Dupont street.

Toledo, O.—Russell & Jennison have contract for paving two streets with Harris paving blocks.

Towson, Md.—Federal Engineering & Construction Company was lowest bidder for improving Park Heights avenue at $21,325.

West New York, N. J.—Henry & Emmer were lowest bidders for improving Thirteenth street at $7,898.

(Continued on page 29.)

Colorado Springs, Colo.

"With regard to the subscription of the City of Colorado Springs for copies of the MUNICIPAL JOURNAL AND ENGINEER, find enclosed herewith city warrant, and you will kindly enter our order for 12 subscriptions in accordance therewith."

K. M. MACMILLAN, City Clerk.

Middletown, N. Y.

"Herewith please find warrant on the City Treasurer for 12 subscriptions to the MUNICIPAL JOURNAL AND ENGINEER for Aldermen and other officials of this city, as per attached list."

I. B. A. TAYLOR, City Clerk.

Odgensburg, N. Y.

"Enclosed find remittance in payment of subscriptions to the MUNICIPAL JOURNAL for officials of the City of Ogdensburg."

D. J. CRICHTON, JR., City Clerk.

Olathe, Kan.

"I think your paper of great value to the smaller cities as well as to the large ones. Our city subscribes for eight copies."

FRANK HODGES, Mayor.

Johnson City, Tenn.

"I enclose check for subscriptions to the MUNICIPAL JOURNAL AND ENGINEER sent to this municipality."

S. H. POUDER, City Recorder.

Grand Rapids, Mich.

"Herewith find New York exchange in settlement of subscriptions to the MUNICIPAL JOURNAL going to the officials of this city."

RUFUS S. FRENCH, City Comptroller.

Defiance, O.

"The JOURNAL has become of such importance that our Council concluded they could not keep house without it. It is an invaluable source of information, and is aiding us in many things."

J. J. MALLEY, City Clerk.

Yonkers, N. Y.

"We send herewith remittance covering fifteen subscriptions to the MUNICIPAL JOURNAL for this city."

CITY OF YONKERS.

Ashland, Wis.

"Enclosed find city order for subscriptions to your journal for city officials as per attached list. Send bill and I will have order drawn in your favor at first meeting of Common Council."

W. W. FISHER, City Clerk.

Dunkirk, N. Y.

"At a recent meeting of the Board of Councilmen, a resolution was passed authorizing me to order subscriptions to the MUNICIPAL JOURNAL AND ENGINEER for all the councilmen and city officials. I will furnish you the names of the parties as soon as possible."

J. P. GROESCH, City Clerk.

East Orange, N. J.

"Send the MUNICIPAL JOURNAL to the following city officials and make out bill to the Mayor and City Council of East Orange, N. J."

A. DURKEE, City Auditor.

Salina, Kan.

"The Mayor wishes to place the MUNICIPAL JOURNAL in the hands of the different committees. Enclosed find draft for five subscriptions for the City of Salina."

CITY CLERK, Council Chamber.

Honolulu, H. I.

"Enclosed find exchange on New York for amount of subscriptions due."

DEPARTMENT OF PUBLIC WORKS.

Herkimer, N. Y.

"Send your JOURNAL to the following officials of this place, and bill to the undersigned."

H. H. LONGSTAFF, Clerk.

Iowa City, Ia.

"Our city is a subscriber to your publication, and we are always pleased to receive your paper. It should be in the city hall of every city and town in the country."

F. K. STEBBINS, Mayor.

The few sample orders for subscriptions to the MUNICIPAL JOURNAL AND ENGINEER, as shown above, illustrate how progressive municipalities, from the smallest to the largest, subscribe for the MUNICIPAL JOURNAL. Our complete list embraces a large proportion of towns and cities from 3,000 upwards.

MUNICIPAL JOURNAL PUBLISHING CO., New York.

Wilmington, Del.—Stewart & Donohue have contract for Elsmere Road at $26,903.

Wilmington, Del.—Christiana Construction Company was lowest bidder for Elsmere Road at $31,770.

LIGHTING

Akron, O.—$10,000 bond issue reported for electric light plant.

Alhambra, Cal.—Bids, February 9, for franchise for furnishing electricity for light, heat and power. A. A. Clapp, City Clerk.

Atlanta, Ga.—May have $5,000 light plant to supply pumping station, filter house, etc. Park Woodward, General Manager, Water Works Department.

Attica, O.—Reported to have issued $6,250 bonds for electric light plant.

Augusta, Ky.—Proposed electric light plant would cost about $11,000.

Battle Creek, Mich.—Reported that council will let a franchise for gas at 85 cents per 1,000 feet.

Binghamton, Conn.—Will probably not erect municipal electric plant.

Birmingham, Ala.—West End city council considering installation of electric light plant.

Braddock, Pa.—May issue $2,000 bonds for municipal electric light plant.

Brockville, Ont.—Will raise $25,000 for improving the lighting plant.

Camden, N. Y.—Voted to bond village for $40,000 for electric light plant.

Chicago, Ill.—May spend $200,000 for improvement of municipal electric light plant. E. B. Ellicott, City Elec.

Clifton Spring, N. Y.—Considering electric light plant.

Columbia, Mo.—City will probably purchase plant of Columbia Water & Lght Company.

Creston, Ia.—May have electric light and gas plant.

Cripple Creek, Colo.—May have $50,000 electric light plant. The Mayor.

Dallas, Tex.—Will investigate construction of municipal electric light plant.

Dubuque, Ia.—Key City Gas Company will erect gas plant at cost of $150,000. George McDean, President.

Duluth, Minn.—May issue $50,000 water and lighting bonds.

Eaton Rapids, Mich.—Will spend $12,000 in construction of municipal lighting plant.

Eau Claire, Wis.—Council will consider question of a municipal lighting plant.

Elkhart, Ind.—Reported that Elkhart Gas Company has franchise for erection of new plant, to cost about $10,000. Cyrus D. Roys, President.

Fairview, Mich.—Reported to be considering electric light system in connection with two villages nearby.

Franklin, Tenn.—A franchise for electric plant has been granted.

Gettysburg, Pa.—Reported that Leight Company wants bids for lighting for five years by electricity, gas or otherwise; also estimate of cost of operating municipal plant.

Glastonbury, Conn.—L. W. Ripley, of Hartford, is considering erection of hydro-electric plant.

Graettinger, Ia.—May have $10,000 electric light plant.

Hannibal, Mo.—Will vote on $100,000 bond issue to rebuild city electric light plant.

Hillsboro, Tex.—Hillsboro Gas & Electric Company incorporated; capital, $100,000. J. F. Strickland, Manager.

Holly Beach, N. J.—Five-Mile Beach Gas Company has franchise for gas plant, and was to ask bids. J. W. Morgan, Camden, N. J.

Huntsville, Utah.—May have municipal electric light plant.

Indianapolis, Ind.—Reported that Indianapolis Gas Company will erect new plant at estimated cost of $650,000. J. R. Pearson, Manager.

Iowa Falls, Ia.—Iowa Falls Gas Company has asked franchise, and will install plant to cost about $25,000, and lay about five miles of main.

Irvington, N. J.—May have electric light plant; have been securing estimates.

Ithaca, N. Y.—Considering burying of all electric wire underground.

Jackson, Mich.—Talking of municipal electric light plant.

Jacksonville, Fla.—Reported that city will purchase light plant of Jacksonville Electric Company.

Kewanee, Ill.—Reported that municipal light plant project has been abandoned.

Lexington, Ky.—A franchise for new lighting plant was to be asked. W. H. McCorkle.

Liberty, Ind.—Reported that council will ask bids for rebuilding of gas and electric light plant recently burned.

Linderwood, N. D.—Ralph Maxwell has franchise for electric light system.

Los Angeles Cal.—A proposition has been submitted the city, which would entail an expenditure of $63,000 for installation of light plant by city. The Mayor.

Louisville, Ky.—Louisville Gas Company will make extensive improvements.

Ludington, Mich.—Frank W. Lyle, of Dowagiac, and H. M. Wallace, of Grand Rapids, have submitted proposition for gas plant.

Marquette, Mich.—Considering enlargement of electric light plant.

Medford, N. J.—Considering installation of gas or acetylene plant. Chairman Township Com.

Montpelier, Ind.—Considering electric light plant.

Morton, Pa.—Council still considering borough lighting.

Moundsville, W. Va.—Reported that Moundsville Electric Company has franchise here.

Mt. Olive, Miss.—Will build water works and electric light plant. Mayor M. M. Evans.

(Continued on page 30.)

From the Daily Press

"The MUNICIPAL JOURNAL AND ENGINEER, of New York, is a periodical that should be placed by the city in the hands of every councilman and city official."
Scranton Tribune, Scranton, Pa.

"The MUNICIPAL JOURNAL AND ENGINEER discusses all topics of general interest to municipal officials, and there is much valuable information in it for engineers."
Milwaukee Sentinel, Milwaukee, Wis.

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The Enquirer, Oakland, Cal.

"The MUNICIPAL JOURNAL AND ENGINEER of New York is the foremost journal of its character in the country, and is an authority on the subject of road and street building."
The Times, Leavenworth, Kansas.

"The MUNICIPAL JOURNAL of New York is a periodical which is recognized everywhere as authority in all matters which bear upon the growth and improvement of cities."
The Sun, Springfield, Ohio.

"The MUNICIPAL JOURNAL AND ENGINEER of New York is the leading periodical in its field."
The Oakland Enquirer, Oakland, Cal.

"The MUNICIPAL JOURNAL of New York contains a large amount of interesting and instructive information on municipal topics, including much that is pertinent to the life and conduct of every considerable municipality. It is full of interest and value, and should be studied faithfully by the "Fathers" of all progressive cities. This publication costs $3.00 per year, and it is richly worth it, as it covers matters of moment to every progressive town, full of value in suggestions and facts. The editorial articles are timely and interesting, in fact, the magazine is a compendium of helpfulness for every man who has upon him the responsibility of the administration of municipal affairs."
The Standard, Bridgeport, Conn.

"The MUNICIPAL JOURNAL AND ENGINEER of New York is one of the ablest magazines published in this republic, and is replete with matters of interest to the officials and residents of every municipality in the country."
Herald, Bayonne, N. J.

"The MUNICIPAL JOURNAL AND ENGINEER of New York contains many practical articles relating to civic topics generally, and the subjects portrayed are most interesting to those engaged in municipal affairs."
Manitoba Free Press, Winnipeg.

"The MUNICIPAL JOURNAL AND ENGINEER of New York is well fitted for its arduous and responsible work."
Press Knickerbocker Express, Albany, N. Y.

"No person interested in municipal work and public improvements can afford to do without this magazine."
Terre Haute Gazette, Terre Haute, Ind.

"The MUNICIPAL JOURNAL AND ENGINEER of New York is full of interesting suggestions and information."
Minneapolis Journal, Minneapolis, Minn.

"Indispensable to those who desire to become thoroughly informed regarding municipal matters."
The Tribune, New York.

"The MUNICIPAL JOURNAL of New York is fairly crowded with timely articles on municipal affairs. No public official can afford to do without this magazine."
The Times, Trenton, N. J.

Neenah, Wis.—Reported that Fox River Gas Light, Heat & Power Company, of Appleton, has franchise for lighting city for ten years.

Negaunee, Mich.—Municipal electric plant will be improved at cost of $15,000.

Newark, N. J.—Essex Union Water & Light Company has five-year contract for electric lighting in New Providence Borough.

New Freedom, Pa.—Bids probably April 1 for lighting and water plant. Estimate cost of plant, $14,000. A Riehling, Chairman Burgess.

New Haven, Ind.—Will have electric plant in connection with water works. J. M. Jackson, Town Clerk.

New Orleans, La.—Consumers' Electric Company has franchise and will erect plant at once.

Pawnee, Ill.—Alvin Underwood has five-year franchise for electric plant.

Penn Yan, N. Y.—No action has been taken for improvement of municipal light plant. J. A. Underwood.

Quincy, Ill.—Independent Gas Company has asked franchise. If granted will build plant and lay five miles of main within six months.

San Antonio Tex.—Will ask bids for electric lighting for two years or more. City Clerk.

San Pedro, Cal.—Ordinance were to be presented, providing for bond issue for municipal lighting plant.

Savannah, Ga.—Director of Public Works has recommended municipal ownership of electric Light Plant.

Shawano, Wis.—Bond issue reported for enlarging electric light plant.

Somers Point, N. J.—Mayor Enoch recommends electric lights, sewerage system, etc.

South Bend, Ind.—Reported that South Bend Electric Company will place wires underground and will need 450 enclosed arc lights. F. A. Bryan, General Manager.

Spanish Fork, Utah.—Probable cost of light plant, $35,000.

Syracuse, N. Y.—Syracuse Lighting Company will make improvements to cost $300,000 this year.

Tampa, Fla.—Tampa Electric Company will build $100,000 power-house.

Tarentum, Pa.—Municipal electric light plant reported in need of repairs.

Towson, Ind.—Reported that Maryland Coal, Coke & Chemical Company has franchise from County Commissioners to lay gas mains on public highways.

Warrensburg, Mo.—Will probably vote soon on municipal electric light plant question.

Watertown, Tenn.—It is reported that city is discussing erection of electric light plant.

Wilkesbarre, Pa.—Reported that Ashley Electric Lighting Company has asked franchise to furnish city with light.

Wilkesbarre, Pa.—Co-operative Light Company will be organized. Frank Slattery, attorney.

Williamsburg, O.—Have issued $12,000 electric light bonds. Chas. Hoffman, Village Clerk.

Wilmington, Del.—Commercial Light, Heat & Fower Company has asked franchise for erection of plant.

CONTRACTS AWARDED

Buffalo, N. Y.—Contract for lighting let Buffalo Gas Company.

Columbus, Ind.—General Electric Company, Schenectady, N. Y., has contract for electric light plant, at $7,033.

Edenton, N. C.—Contract let Standard Electric Company, Norfolk, Va., for electric lighting plant.

Elmer, N. J.—Welsbach Street Lighting Company has contract for thirty street lights.

Jersey City, N. J.—American Lighting Company, of Baltimore, has contract for gas street lighting at $24 per lamp.

Newport News, Va.—Citizens' Railway, Light & Power Company has made proposition for renewal of street lighting contract at $68.50 per lamp per year for three years, and $64 per lamp per year for five years. J. J. Thomas, Chairman Lighting Com.

Newton, Pa.—Newton Electric Street Railway Company received contract for lighting borough streets for three years at $1,827 per year.

St. Paul, Minn.—Cleveland Vapor Light Company has contract for 1904 for street lighting at about $85,473. St. Paul Gas Light Company has contract for heating and lighting city hall and court house for three years at $39,000.

Schenectady, N. Y.—Reported that Schenectady Railway Company has contract for city lighting for three years at 22½ cents per lamp per night.

Wheeling, W. Va.—Sands Electric Company has contract for 80 horse-power dynamo, engine and switchboard for county lighting plant, at $2,691.

PUBLIC BUILDINGS

Ada, Minn.—Have issued $25,000 school bonds.

Altoona, Pa.—It is stated that $100,000 high school will be erected.

Amsterdam, N. Y.—Plans are ready for a $70,000 high school.

Baton Rouge, La.—Plans were wanted for a modern school. Mayor Bynum.

Bessemer, Ala.—A vote was to have been taken on $35,000 bond issue for a new school.

Birmingham, Ala.—Discussing the erection of a new high school.

Bridgeport, Conn.—Estimated cost of remodeling the city hall placed at $50,000.

Buffalo, N. Y.—Have issued $150,000 school bonds.

Burlington, N. J.—Ordinance provided for $23,500 bond issue for schools.

Carthage, Mo.—Plans have been made for a $75,000 high school.

Chattanooga, Tenn.—A high school may be erected here. Board of Education.

Chilton, Wis.—Cost of remodeling public school placed at $19,000.

(Continued on page 31.)

The Best Books on Municipal Subjects

TREATISE ON HYDRAULIC AND WATER-SUPPLY ENGINEERING. Practical construction of waterworks in America. J. T. Fanning. Illus., 650 pp. $5.00. v.

PRACTICAL TREATISE ON THE CONSTRUCTION OF ROADS, STREETS AND PAVEMENTS. Gen. Q. A. Gilmore. Illus. $2.00. v.

PURIFICATION OF PUBLIC WATER SUPPLIES. John W. Hill. 304 pp., illus. $3.00. v.

PORTLAND CEMENT. Its manufacture and use. Charles D. Jameson. $1.50. v.

REPORT ON THE FILTRATION OF RIVER WATERS FOR THE SUPPLY OF CITIES IN EUROPE. James P. Kirkwood. Illus. $7.50. v.

WATER-WORKS DISTRIBUTION. A guide to the laying out of distribution mains for cities and towns. J. A. McPherson. Illus. $2.50. v.

SEWAGE DISPOSAL IN THE UNITED STATES. G. W. Rafter and M. N. Baker. Illus. $6.00. v.

SEWAGE TREATMENT, PURIFICATION AND UTILIZATION. J. W. Slater. (English.) $2.25. v.

SEPARATE SYSTEM OF SEWERAGE. Theory and construction. Cady Staley and G. S. Pierson. Illus. $3.00. v.

NEW ROADS AND ROAD LAWS IN THE UNITED STATES. Gen. Roy Stone. Illus. $1.00. v.

PRACTICAL TREATISE ON THE EXAMINATION OF MILK, CREAM, BUTTER, ETC. J. A. Wanklyn. $1.00. v.

WATER ANALYSIS. Treatise on the examination of potable water. J. A. Wanklyn. $5.00. v.

SEWERAGE AND LAND DRAINAGE. Geo. E. Waring, Jr. Illus. $6.00. v.

MODERN METHODS OF SEWAGE DISPOSAL FOR TOWNS, PUBLIC INSTITUTIONS AND HOUSES. Geo. E. Waring, Jr. Illus., 260 pp. $2.00. v.

DESIGN AND CONSTRUCTION OF STORAGE RESERVOIRS. Arthur Jacob. 50 cents. v.

WATER AND WATER SUPPLY. W. H. Corfield. (English.) 50 cents. v.

SEWERAGE AND SEWAGE PURIFICATION. M. N. Baker. 50 cents. v.

POTABLE WATER AND METHODS OF DETECTING IMPURITIES. M. N. Baker. 50 cents. v.

FLOW OF WATER IN OPEN CHANNELS, PIPES, SEWERS, ETC. (With tables.) P. J. Flynn. 50 cents. v.

THE TREATMENT OF SEWAGE. Dr. C. Meynott Tidy. 50 cents. v.

ART OF ILLUMINATION. How to properly distribute artificial light. Louis Bell, Ph. D., 350 pp, illus. $2.50. m.

WATER WORKS FOR SMALL CITIES AND TOWNS. John Goodell. 281 pp, illus. $2.00. m.

SOME DETAILS OF WATER WORKS CONSTRUCTION. W. R. Billings. 96 pp, illus. $2.00. m.

WATER WASTE PREVENTION. Its importance and the evils due to its neglect. Henry C. Meyer. $1.00. m.

ELEMENTS OF SANITARY ENGINEERING. Mansfield Merriman. 222 pp. $2.00. w.

RESERVOIRS FOR IRRIGATION, WATER-POWER, AND DOMESTIC WATER SUPPLY. Also an account of various kinds of dams and their construction. James D. Schuyler. 432 pp, illus. $5.00. w.

MUNICIPAL YEAR BOOK. M. N. Baker. 350 pp. $3.00. e.

AMERICANS IN PROGRESS. A story of settlement work in Boston. Robert A. Woods. 383 pp. $1.50 net. h.

Municipal Journal Publishing Co.
253 BROADWAY, NEW YORK

Cleveland, O.—May issue $150,000 bonds for public market.

Colorado Springs, Colo.—Estimated cost of Carnegie Library, $60,000.

Columbus, Ind.—Estimated cost of high school placed at $50,000.

Conshohocken, Pa.—$100,000 high school proposed, for which a site will be secured by a committee.

Crookston, Minn.—Will probably erect $30,000 high school. Board of Education.

Danbury, Conn.—Plans prepared for $100,000 normal school.

Dublin, Ga.—Lawrence County may build a new jail. County Clerk.

El Paso, Tex.—Will erect $10,000 city hall. The Mayor.

Fayetteville, Ark.—Proposed courthouse will cost $60,000, and plans have been prepared. County Clerk C. P. Boles.

Gulfport, Miss.—Plans have been made for a new school.

Hoboken, N. J.—Have issued $140,000 school bonds.

Hornellsville, N. Y.—It was stated that bids were asked for a $25,000 library.

Jamestown, N. Y.—Will let contract for a $20,000 jail.

Lewiston, Pa.—Plans have been prepared for a $30,000 high school.

Los Angeles, Cal.—Plans have been made for a $200,000 high school.

Lynn, Mass.—Will erect an engine house in 5th Ward.

Macon, Ga.—A new post office and Federal building will be erected.

Malden, Mass.—Mayor Dean recommended the erection of a school in Maplewood.

Manchester, N. H.—It is said that an engine house and public bath will be erected.

Marlboro, Mass.—Mayor Milton recommended the erection of a municipal building.

Mays Landing, N. J.—Considering the erection of a courthouse, to cost about $80,000.

Melrose, Mass.—Contemplating the erection of a city stable and new police station.

Michigan City, Ind.—Two new schools are to be erected this season.

Moultrie, Ga.—Voted $25,000 bonds for school purposes. The Mayor.

Mt. Vernon, Ia.—It is stated that $50,000 library will be erected.

Nacogdoches, Tex.—Voted to issue $40,000 school bonds.

Newport, R. I.—Will issue $100,000 bonds for a new high school.

New York, N. Y.—Have issued $1,450,000 bonds for schools and other public buildings. Plans have been prepared for a $265,000 school on Tenth street. C. B. Snyder, Board of Education.

Northampton, Mass.—Mayor Hallett recommended a new school to cost $50,000.

Oak Park, Ill.—Will probably erect a $160,000 public bath house.

Pittsburg, Pa.—Plans have been prepared for $100,000 school for Mt. Albion.

Portland, Me.—Board of Education is said to have contemplated the erection of a school and alteration to others.

Poughkeepsie, Pa.—Plans prepared for a school in the 1st Ward to cost $20,000.

Reisterstown, Md.—Plans prepared for $10,000 building for Franklin high school.

Richmond, Va.—May erect a $35,000 school in the spring.

Rochester, N. Y.—Said that bids were to be asked for a public market to cost $150,000. Will probably erect a $25,000 bath house.

Rutledge, Tenn.—Grainger County Commissioners appropriated $25,000 for a new court house.

San Bernardino, Cal.—May have a new city building.

Sharon, Pa.—A site has been chosen for a $40,000 school.

Somerset, Pa.—Plans prepared for court house. County Commissioners.

Spokane, Wash.—Said to have issued $200,000 school bonds.

Springfield, Mass.—It was reported that Hampton County would erect an addition to the county court house.

Syracuse, N. Y.—Bids, February 2, for a court house. A. N. Palmer, Onondaga County Savings Bank Building.

Tishomingo, Ind. Ter.—Will issue $20,000 bonds for a school. The Mayor.

Versailles, Ky.—It is stated that $35,000 library will be erected.

West Orange, N. J.—Will erect a school to cost about $48,000. Board of Education.

Winchester, Va.—Plans have been prepared for a $100,000 public library.

Yazoo City, Miss.—Plans for a $30,000 school were accepted. R. H Hunt, Architect, Chattanooga, Tenn.

Contracts Awarded

Augusta, Ga.—Contract for school let T. O. Brown at $5,000.

Boonville, Ind.—Contract for $63,000 court house has been awarded.

Boston, Mass.—Mack & Moore were low bidders for the three-story grammar school at $129,900.

Brownwood, Tex.—Contract for Carnegie library was awarded. P. A. Harris, of Waco, Tex.

Delaware, O.—S. Shureman, Rockford, Ill., received contract for $50,000 school.

Iowa City, Ia.—Butler Bros., of St. Faul, Minn., received contract for post office at $42,500.

Lake Park, Ia.—H. E. Potter Constr. Co. has contract for a school to cost $18,000.

Lawrence, Mass.—Geo. M. Cole & Co., received contract for new school at $104,992.

New Brighton, N. Y.—J. C. Vreeland Building Co. has contract for borough hall at $230,000.

(Continued on page 32.)

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ENGINEERING FOR LAND DRAINAGE. Manual for laying out and constructing drains. Charles G. Elliott. 222 pp., illus. $1.50. w.

HAND BOOK ON SANITATION. Manual on theoretical and practical sanitation. George M. Price. (English.) 306 pp., illus. $1.50 net. w.

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ROADS: THEIR CONSTRUCTION AND MAINTENANCE. Special reference to road materials. Allen Greenwell and J. V. Elsden. (English.) 280 pp., illus. $1.50. wh.

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FACTS ON FIRE PREVENTION. The result of tests by British Fire Prevention Committee. Edwin O. Sachs. (English.) 2 vols., 226 pp. each. Illus. $10. sr.

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New Castle, Pa.—P. H. McCormick & Co. has contract for addition to Henry County court house at$41,685.

New Orleans, La.—L. P. Hazen, Cincinnati, O., was low bidder for naval station building No. 6 at $70,838.

New York, N. Y.—The J. D. Murphy Co. has contract for 69th Regiment armory at $606,266. P. J. Brennan has contract for school No. 63 at $293,000.

Riverside, Cal.—It is stated that J. C. Stanley has contract for city hospital at $14,180.

Rock Island, Ill.—McConochie & Sons were low bidders for storehouse "A" at arsenal at $131,305.

Rome, Ga.—Geo. Moore & Sons were low bidders for addition to post office at $39,948.

Schenectady, N. Y.—James Malony has contract for school at $49,169.

Seattle, Wash.—Cawsey & Carney has contract for Beacon Hill school at $17,800.

Terre Haute, Ind.—T. J. Martin & Co. has contract for school at $28,037.

Troy, N. Y.—Chas. P. Boland Co. received contract for two engine houses.

WATER SUPPLY

Adams, Ore.—Reported that bonds will be issued for water works.

Amite, La.—May vote on bond issue for water works.

Auburn, N. Y.—May spend $400,000 or more on improving water works. Mayor T. M. Osborne.

Augusta, Ky.—Will install $36,000 water works system and $11,000 electric light plant. The Mayor.

Augusta, Me.—Improvements to water system may be made.

Bordentown, N. J.—A Board of Water Commissioners has been appointed and $5,000 bond issue authorized for preliminary work towards water works. David R. Brown, Commissioner.

Cambridge, Mass.—Estimated cost of additional pipe line is $338,935. May issue $500,000 bonds for improvements to water works.

Cambridge, Pa.—Mercer Water Company will introduce meter system in April.

Canon City, Colo.—Water supply considered.

Chickasha, Ind. Ter.—Plans preparing water works plant, for which $75,000 bonds are reported sold.

Cienfuegos, Cuba.—Bids, April 2, by C. C. Vernuele, 203 Broadway, N. Y., for cast iron pipe, special castings, valves, hydrants, etc.

Cleveland, O.—As predicted several months ago, the council has appropriated $499,000 for water meters. State Board of Health advises that only by filtration can Cleveland obtain pure water supply.

Columbus, O.—New water works proposed. City water will have to filtered.

Dillen, S. C.—Contemplating water works system. A. B. Jordan, Manager.

Elberton, Ga.—New council will consider water works question. R. W. Heard, Manager.

Fort Monroe, Va.—Bids, February 2, for erecting building and installing boiler and distilling plant. C. P. Townsley, Q. M., U. S. A.

Governor's Island, N. Y.—A well of 75 gallons per minute capacity has just been completed here by Elisha Gregory, 123 Liberty street, New York.

Greenfield, Mass.—Plans prepared for reservoir to cost about $15,000.

Higginsville, Miss.—Will spend about $8,000 in improving water works and light plant. Daniel Hoefer, Mayor.

Huntingburg, Ind.—H. W. Alpers, Chairman Water Committee, writes that this place is contemplating a complete water meter system.

Jackson, Miss.—City Engineer Walter Kirkpatrick estimates cost of water works, for which twelve artesian wells would be necessary, at $240,000.

Jacksonville, Ill.—Bids, February 10, for pumping plant of 1,000,000 gallons hourly capacity. Meredosia Lake, Drainage and Levee District.

Johnstown, O.—Will construct water works. W. S. Harding, President Board of Public Affairs.

Lebanon, Pa.—Will vote in spring on spending $150,000 for additional pipe line.

Lewiston, Idaho.—Have issued $20,000 water works bonds.

Ligonier, Ind.—Bids, March 9, for improvement of water works. H. Jeanneret, City Clerk.

Lima, O.—Estimated cost of water works, $150,000. John Thomas, Board of Public Service.

Lincoln, Neb.—City Engineer George L. Campen will prepare estimates of cost of pumping plant for Mocket well. Special pumps will be required.

Lindsay, Ont.—Will spend $10,000 on water works.

Lisbon Falls, Me.—May have $75,000 water system.

Miamisburg, O.—City needs $30,000 more to build proposed water works.

New York, N. Y.—Have issued $550,000 water bonds.

Oil City, Pa.—Bids, February 15, for triple-expansion condensing crank and fly-wheel pumping engine, of 3,500,000 gallons capacity. P. C. Porter, Clerk Water Works Com.

Pawtucket, R. I.—Wm. H. Barclay, Commissioner Public Works, favors new pumping plant.

Prospect, N. Y.—Town may vote on water works.

Quincy, Mass.—Mayor Bryant's message advocates appropriation for water system extension.

Randolph, Wis.—Reported that this place is considering water works.

Reading, Pa.—Will spend $4,000 for new meters in 1904.

Santa Barbara, Cal.—Bids, February 23, for tunnel 19,560 feet long, size, 5 x 7 feet. J. B. Lippincott, Engineer, 422 Byrne Building, Los Angeles.

Sea Isle City, N. Y.—Francis T. Corson, of Ocean City, will probably get franchise for water works here.

Sheboygan, Wis.—City Water Company has offered to sell its plant to the city for $396,000. C. U. Boley, C. E.

(Continued on page 33.)

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Sheridan, Wyo.—May have $83,000 water system at Fort McKenzie, Wyo.

Sioux City, Ia.—Considering expansion of water mains. G. B. Healy, President Board Trustees of Water Works.

Springfield, Mass.—Mayor Stone recommends improvements for water supply.

Strasburg, Va.—Will have $10,000 gravity system of water works. City may let franchise or put in works itself. Supply to be from Massanutten Mountain, and reservoir will be built.

Taylor, Tex.—Reported thath Taylor Water Works Company will extend mains here.

The Dallas, Ore.—Plans preparing for extensions to water works. J. M. Filloon, City Recorder.

Tiffin, O.—Wants plans and estimates for water works system. C. J. Peters, C. E.

Tillamosk, Ore.—Voted not to issue bonds for water works.

Tishomingo, Ind. Ter.—Will issue $30,000 bonds for water works.

Toledo, O.—May have mechanical filtration plant. Mayor Jones.

Wasco, Ore.—Bids, probably February 1, for $10,000 water works construction.

Waterloo, Ont.—Will spend $10,000 on water works and light plant.

Whittier Cal.—Voted $15,000 water bonds.

Winfield, Kan.—Will vote on issuance of bonds for water works and light plant.

Worcester, Mass.—Considering additional water supply. Mayor W. H. Bodget.

Youngstown, O.—Plans preparing for $125,000 filter plant, for which bonds have been sold. F. M. Lillie, C. E.

Contracts Awarded

Aurora, Neb.—Reported that Jos. Burns, of Lincoln, has contract for new boilers and pumping machinery for water works at $5,288.

Baltimore, Md.—Contract for supplies for water department let as follows: Cast-iron work, Stewart R. Carr & Co., Central Foundry Company, and J. J. Lacy & Co., for $12,400; brass castings, Wm. Gisnel & Sons and J. Regester Sons Company, for $4,000; lead lined iron pipes, Lead Lined Iron Pipe Company, at $5,300; service pipe connections, A. P. Smith Mfg. Company, $4,300; service and valve boxes, Central Foundry Company, $3,600; water meters, Union Meter Company and Hersey Mfg. Company, at $17,000; clamps and tapping valves, A. P. Smith Mfg. Company, at $2,700; cast-iron pipes and fittings, U. S. Pipe & Foundry Company, at $21,700.

Boston, Mass.—John F. Magee & Co., Taunton, has contract for south side of Wachusett Reservoir, at $118,570.

Buffalo, N. Y.—Contract for water works equipment let as follows: Boilers, Farrar & Trefts, $32,083; conveyors, Steel Cable Eng. Company, $32,650; steam mains, G. W. Danforth Company, $10,760; Buffalo Forge Company, $5,766.

Cairo, Ill.—Herron-Brady Company, Chattanooga, Tenn., has contract for 4,500,000-gallon pumping engine for city.

Dallas, Tex.—C. W. Olcott, 102 First avenue, has contract for 10-inch water pipe in two streets.

Ely, Minn.—Hugh Steele, of Duluth, has contract for laying under water 2,400 feet 10-inch cast-iron intake pipe and setting 10-inch gate valves; also furnishing and laying 125 feet of 10-inch pipe.

Fairview, Pa.—Fairview Township Water Company has been chartered to furnish water to New Cumberland.

Kansas City, Mo.—Holly Mfg. Company, Lockport, N. Y., was low bidder for 25,000,000-gallon vertical triple-expansion considering pumping engine, at $84,900.

Mena, Ark.—Contract let Joseph Evans for water works at $20,000.

Rochester, N. Y.—John J. L. Friedericks & Co. has contract for new gatehouse at Highland Reservoir at $14,537.

San Bernardino, Cal.—Baker Iron Works bid $24,696 for three-cylinder pumping plant and Machinery & Electric Company bid $28,975 for two-cylinder plant.

Sandpoint, Idaho.—Reported that Drumheller & Malloy have franchise to lay mains and supply water.

San Francisco, Cal.—Clark & Henry, Stockton, Cal., were lowest bidders for 50,000 gallon tank on 50-foot trestle at Fort Mason, at $5,824.

Seattle, Wash.—Washington Pipe & Foundry Co. has contract for water mains in Kirkland at $3,905.

Shawnee, Okla. Ter.—American Light & Water Supply Company has contract for water works system at $122,000.

Springfield, Neb.—Reported that James P. Connolly, of Omaha, has contract for water works at $6,768.

Vinita, Ind. Ter.—Allen Black & Co., Minneapolis, Minn., has contract for water works and sewerage system at $73,455.

Woodward, Okla. Ter.—J. C. Weaver, Dallas, Tex., has contract for water works at $44,000.

Yorktown, Tex.—San Antonio Machine & Supply Company, of San Antonio, has contract for water works at $7,500.

SEWERAGE

Aberdeen, S. D.—It is stated that an improved sewer system was to be recommended by Mayor West.

Berwick, Pa.—Bids are wanted February 4 for 6,362 feet of 3- to 5-foot brick sewer; 8,816 feet of 5- to 24-foot terra-cotta pipe; thirty-four manholes; seventy-one water inlets, and two flush tanks. J. M. Harvey, Chairman Street Com.

(Continued on page 34.)

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Castile, N. Y.—It was stated that $30,000 might be issued for a sewer system. Village Trustees.

Dayton, O.—Estimated cost of a sanitary sewer system is $11,450. City Engineer F. M. Turner.

Dolgeville, N. Y.—Were to vote on $40,000 bonds for sewers.

Downers Grove, Ill.—Plans for sewer system will be prepared.

Fulton, Mo.—Bids, about February 15, for $23,000 sewer system.

Grand Rapids, Mich.—Resolution provided for a trunk sewer for the west side, to cost about $180,000.

Hoboken, N. J.—$705,000 bonds for sewers may be issued.

Lake Charles, La.—Will vote on $120,000 bond issue for sewers.

Lakewood, O.—Have issued $26,056 sewer improvement bonds. Village Clerk Sensel.

Lawton, O. T.—A $45,000 sewer system may be constructed.

Little Rock, Ark.—Plans prepared for pipe sewer in District 3 to cost $30,000.

Macon, Ga.—T. W. Wilcox, City Engineer, has surveyed for sewer system, for which $40,000 bonds were issued.

Melrose, Mass.—Mayor Buttrick recommended $20,000 bond issue for surface drainage.

Muskegon, Mich.—Probable cost of Spring street sewer about $30,000. City Engineer Gamble.

Newark, N. J.—A $27,000 sewer system for Parkview section proposed. Board of Public Works.

New Orleans, La.—A new pumping plant, to cost $145,000, may be installed.

Northampton, Mass.—Main sewer will be extended at a cost of about $50,000.

Pekin, Ill.—Plans have been prepared for a sewer system.

Portland, Ore.—$100,000 worth of sewer bonds have been issued.

Red Wing, Wis.—About 1,840 feet of 4 x 6 foot brick sewer will be built at a cost of $11,640. City Engineer Danforth.

Rye, N. Y.—Plans for a general sewer system have been under way.

Salem, Mass.—Mayor Peterson recommended $100,000 appropriation for sewer system.

Seattle, Wash.—Will probably ask bids for sewer to cost $80,000. Board of Public Works.

Spring Grove, Pa.—A vote was to be taken on the question of a sewer system.

Topeka, Kan.—Estimated cost of Second Ward sewer placed at $136,885.

Vailsburgh, N. J.—Bids were to be asked for 18 miles of sewers for which plans were accepted.

Washington, D. C.—Bids, February 20, for the construction of sewers. Commissioner H. L. West.

West Orange, N. J.—Have issued $150,000 sewer bonds. Town Clerk McDonough.

Wyandotte, Mich.—Will issue $100,000 bonds for sewer system.

CONTRACTS AWARDED

Auburn, N. Y.—It is stated that J. C. Dayton received contract for Havens avenue sewer.

Boston, Mass.—Coleman Bros. have contract for Sects. 2, 3 and 4 of high level sewers at $36,553. D. F. O'Connell has contract for Sect. 1 of Dorchester high level sewer at $14,177; Hanscom Company has Sect. 2 of same at $12,042.

Brooklyn, N. Y.—W. P. McGary was low bidder for sewers in several streets at $78,399. Ficklin & Stobaugh was low bidder for sewer in Pitkin avenue.

Buffalo, N. Y.—H. P. Burgard was low bidder for 42-inch main at $46,000. Dark & Co. has contract for sewers in two streets at $5,700.

Dayton, O.—R. J. Paul has contract for 520 feet of 12- to 36-inch sewer at $1,791, and Fred Goehl for Eastern avenue sewer and two others.

Fort Smith, Ark.—Bruce Bros. received contract for 2,600 feet of 8-inch and 4,000 feet of 6-inch pipe sewer.

Grand Rapids, Mich.—Jacob Heerrechaaf received contract for sewer in Fifth avenue at $2,779.

Guttenburg, N. J.—George Horung has contract for main outlet sewer at $33,669.

Hartford, Conn.—C. H. Slocomb received a contract for a sewer.

Kansas City, Mo.—It was stated that George H. McIntosh received contract for sewer at $220,000.

Lancaster, Pa.—Stone, Jordan & Co., Philadelphia, were to receive contract for sewers at $180,000.

Los Angeles, Cal.—J. O. Mecereau received contract for extending outfall sewer 800 feet at $14,450.

New York, N. Y.—Pioneer Construction Company was low bidder for sewer in Central Park at $36,825.

Oakland, Cal.—It is stated that E. B. & A. L. Stone Company has contract for Telegraph avenue sewer at $136,511.

Pasadena, Cal.—C. E. Chamberlain, 188 S. Lake avenue, has contract for saltglazed sewer pipe at $4,454.

Salt Lake City, Utah.—Jas. Kennedy & Co., Fargo, N. D., received contract for sewer extension at $18,801.

Syracuse, N. Y.—Contract for sewers in several streets let Samuel Bonn at $8,006. Martin Lavelle has contract for 24-inch sewer in several streets at $4,987.

Tacoma, Wash.—Carlson & Swanson received contract for sewer in District 23 at $2,925.

Terre Haute, Ind.—W. H. Harris received contract for Orchard street sewer.

Toledo, O.—O'Neill & Tansey were low bidders for sewer No. 895 at $1,959.

(Concluded on page 35.)

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FIRE SUPPLIES

Anaconda, Mont.—Fire Chief Sanger recommended purchase of chemical hose.

Bucyrus, O.—A new fire house is to be erected. Mayor Valentine.

Chester, O.—A fire department has been organized.

Cincinnati, O.—$300,0000 is to be spent for new fire apparatus.

Claremont, Cal.—A fire department may be formed.

Cleveland, O.—Will expend $22,500 for fire apparatus in next five months.

Coatesville, Pa.—Washington Fire Co. is to build a new house in near future, so Chief Steinwachs wrote.

Cohoes, N. Y.—More alarm boxes may be put in.

Detroit, Mich.—Reports state that two or three engines may be purchased.

Greenville, Pa.—Paid department organized. Chief Keck.

Lake Charles, La.—Were to vote on $10,000 bonds for fire apparatus. The Mayor.

Lexington, Ill.—Better fire protection is to be considered.

Nashville, Tenn.—Chief Rosetta recommended that the water mains be extended, more hydrants be installed, a new engine house be erected, and a new engine and a combination wagon be purchased.

Nescopeck, Pa.—A fire company has been organized.

New York, N. Y.—Comr. Hayes promised horseless engines.

Reading, Pa.—Union Fire Co. is to have $10,000 station.

Rockaway Beach, N. Y.—Fire boat desired by Chief Hummel and residents.

Sterling, Colo.—Volunteer department organized.

Toronto, Can.—J. S. Craig, Supt. Fire Alarm, recommended twenty-circuit, central office system.

Trafford City, Pa.—A fire department has been organized.

MISCELLANEOUS

Aberdeen, S. D.—Plans have been under way for sewage disposal.

Akron, O.—It was stated that a garbage plant might be installed. R. F. Hamlin, City Auditor.

Atlanta, Ga.—It was stated that a $100,000 sewage purification and septic tank might be installed. C. D. Winn, Chairman Committee on Sewers and Drains.

Baltimore, Md.—Baltimore Sanitary Contracting Co. received a one-year contract for collecting and disposing of ashes, refuse, etc., at $48,500.

Bayonne, N. J.—Mayor Thomas Brady recommended the purchase of a street sweeper.

Buffalo, N. Y.—The Buffalo Sanitary Co. received the contract for street cleaning for five years.

Charleston, W. Va.—The Public Utilities Co., New York, received contract for twenty-ton incinerator at $8,077.

Chattanooga, Tenn.—It is said that a new and enlarged system for garbage disposal will have to be adopted. J. A. Allen, Supt. City Garbage Dept.

Croton, Conn.—Sewage disposal has been under consideration.

Danville, Ill.—Garbage disposal has been considered.

Fort Wayne, Ind.—Frank Draker received contract for collecting kitchen garbage for 1904.

Fresno, Cal.—The construction of a septic tank has been under consideration.

Harrisburg, Pa.—Harrisburg Sanitary Co. was to receive contract for ten years for collecting garbage at $20,080 per year, and will build a modern garbage plant.

Indianapolis, Ind.—The Indianapolis Street Sweeping Co. received contract for street sweeping at 13 9-10 cents per 10,000 square feet, and will use pneumatic machines. The Indianapolis Sanitary Co. has contract for collecting and disposing of garbage at $4,000 per year.

Leominster, Mass.—Plans have been prepared for sewerage extension and filter beds.

Manchester, N. H.—Considering garbage and refuse disposal.

Marion, Ind.—A $10,000 garbage crematory has been considered. Mayor John Kiley.

New York, N. Y.—$1,750,000 bonds for parks and street openings have been issued.

Sebring, O.—Plans for sewage disposal plant being prepared. L. E. Chapin, Canton, O.

South Haven, Mich.—It was said that a vote would be taken on $50,000 bonds for parks.

Springfield, O.—Plans have been prepared for sanitary sewerage system and disposal plant. City Engineer W. H. Sieverling.

Tampa, Fla.—The Decarie Mfg. Co. installed a garbage crematory at a cost of $17,500.

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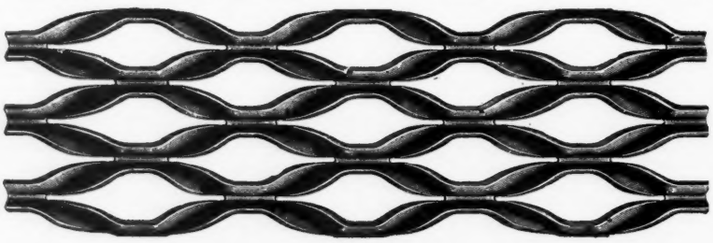

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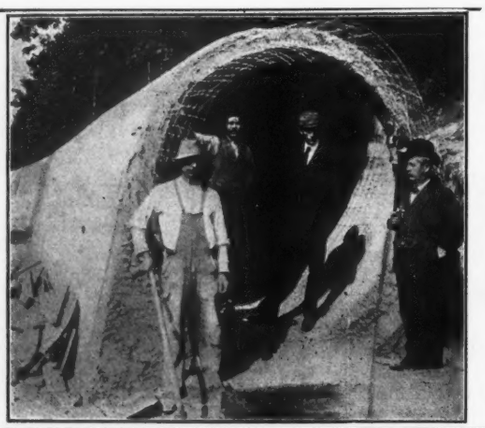

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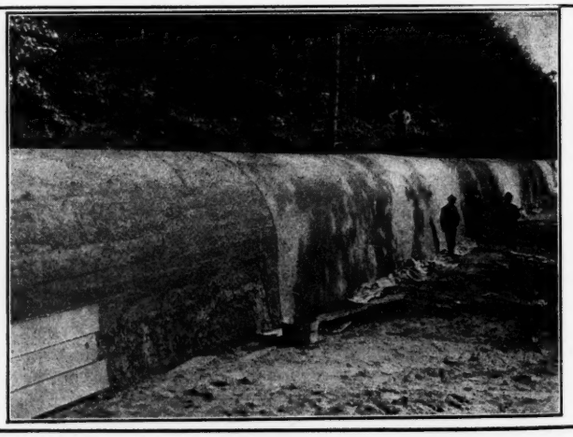
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